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ART. I.—AN ESSAY ON SCAMMONY, WITH AN EXAMINATION INTO THE QUALITIES OF THE DRUG FOUND IN THE MARKET,

Read before the College of Pharmacy, December 6th, 1847.

By Joseph Carson, M. D., &c.

The subject of scammony at the present time is a deeply interesting one. As one of the oldest articles of the Materia Medica, it commands attention. Its history is curious, and the value which is found attached to it in the earlier records of medicine, prompts to the investigation of its present claims to regard and confidence. It is generally understood that the drug is of doubtful character, but few are aware that there is so great a reduction of its value, so great a dissimilarity of its physical and sensible properties, and so extensive a misconception of the true qualities which pertain to it. What is written in the works on Pharmacology may be familiar to those who investigate such subjects, but until the difficulty of procuring even tolerable specimens of the article is encountered, they can not be forcibly impressed with the remark of Dr. Christison, "that scarcely any of the descriptions in systematic books, especially in the English language, convey a correct idea of the scammonies of the present day, at least of those to be met with

in the British market;" which circumstance he further states, "can only be accounted for by supposing that authors have copied one from another, for some considerable time, instead of examining the commercial varieties of the drug for themselves." The application of these statements to this country is equally pertinent, and the present communication has been prepared, that the attention of this College may be directed to the topic, in which its members are deeply concerned. In preparing the essay, it has been thought, that it would be more satisfactory to treat of the subject as a whole, than merely to present the facts which some research has elicited; that while the existing state of things is exhibited, prominent points of comparison may be afforded, and the whole truth if possible arrived at. In so doing, the proper credit will be awarded to those writers who have assisted the undertaking.

The first writer on scammony, in whose treatise any attempt at description is met with, is Dioscorides. He was a native of Cilicia in Asia Minor, and lived during the second century; he wrote in Greek, and his book has been much an object of comment. The description of the plant is defective, but yet so given as to apply to the species which has since been recognized as the true one, the *Convolvulus scammonia* of Linnæus, Sp. Pl. 218. It was called *Scammonea syriaca* by Bauhin, *Pin.* 294, by *Ray, Hist.* 722; and *Convolvulus syriacus* by *Morrison Hist.* and by *Tournefort. Syrian Bind-weed,* was the common term applied to it. Sibthorp in his *Flora Græca,* has introduced the species of Linnæus by its name *C. scammonia,* and says, "that from this species Alleppo-scammony is prepared." He met with it at Rhodes, but he has thrown a doubt over the question of identity, with respect to this species and that of Dioscorides, and supposes that the latter was the *C. farinosus.* In treating this subject, Professor Lindley remarks, "upon what ground Dr. Sibthorp referred the scammony of Dioscorides to *Convolvulus farino-*

sus of Linn., a Maderia plant with slender roots, and no appreciable quantity of resin, cannot now be ascertained, for there is no specimen of *C. farinosus* in his herbarium." Professor Lindley has further shown, that if the reading of the Aldine edition of Dioscorides, of 1499, be taken, in which the Greek word for *thick* instead of that for *hairy* is employed, as applied to the branches, the description agrees with the modern plant.

Matthiolus, the chief commentator upon Dioscorides, in his Latin translation, renders the description in the same manner. Upon consulting the edition of his work published by Bauhin, at Basil in 1598, it does not appear that any doubt existed with respect to the plant described by Dioscorides, and that which was placed at the disposal of the translator, by the Imperial Ambassador at Turkey, (Seigneur Angerius de Busbecke,) from the court of the Emperor Ferdinand. Of the plant thus procured he has given an excellent figure, which corresponds with those since published by Woodville and Nees von Esenbeck. This is the *C. syriacus* of Morrison cultivated in England, by Collinson.

The locality to which Dioscorides referred the best scammony was Mysia, a portion of Asia Minor, near the Pontus Euxinus, and he states that this is preferable to that of Syria and Judea. Matthiolus has stated, that in his day it was brought from Alexandria and Syria by way of Venice. Tournefort *(Voyage into the Levant)* met with the drug at Samos, and stated that the plant shown to him corresponded to the description of Dioscorides; he says the same of the Syrian plant. Belon met with the plant at Candia, which he says grew wild on the mountains; (ed. 1553, *Travels.*) M. Hasselquist, a Dutch naturalist, more recently has said that the best comes from Marach, (where resides a Pacha,) four days' journey from Aleppo, near the frontiers of Armenia, and that he has seen the convolvulus in the valleys between Nazareth and Mount Carmel. Finally,

Captain D'Urville met with the plant at Cos. It is evident then that the plant is not confined to any one locality, but has extended and now extends through the Levant, which is an additional reason for assuming that the present plant and that of the ancients are the same. There appears, indeed, to have been no dissent, except in the case of Dr. Sibthorp.

In tracing the history of the drug, the fact is apparent that the estimation of the quality of it, as produced in different places, has undergone revolution; thus Dioscorides eulogizes the Mysian scammony, stating that it is bright, clear, clean, ash coloured, spongy and porous, while that from Syria and Judea is the worst of all, as it is massive, weighty and sophisticated with tithemalus, (Euphorbia) and fecula of the orobus (lentil.) Tournefort wonders that it should have been preferred to that of Judea, which is the same as that of Syria. Matthiolus, as we have stated, indicated the source as Alexandria and Syria. As a consequence, the trade in it assumed new directions, and new locations became prominent, from which have been derived specific appellations. Upon Aleppo, as a depot, the article was concentrated, which was of the best kind, and hence the designation *Aleppo Scammony*. According to Hasselquist, it was brought there in small sacks. The appellation of Smyrna scammony, according to Tournefort, originated in the circumstance that the product of Natolia was carried to Smyrna.*

But other causes have been operative in changing the course of supply; thus St. Jean D'Acre was once a port of exit, but it was abandoned, as the Arabs plundered the caravans on their way to it from the neighbourhood of Mt. Carmel. St. Jean d'Acre is mentioned as one of the ports of shipment by Pomet, (ed. 1695.) The distinction between Aleppo and

* From the close proximity of Smyrna to the ancient province of Mysia, it would appear that the same locality has always produced the article, especially if, as Tournefort remarks, Natolia, which includes a portion of Mysia, furnished the Smyrna kind.

Smyrna scammony was made in commerce for at least a century and a half, it has but recently been abandoned, for reasons to be stated directly. When the *Dictionnaire Universel des Drogues Simples of Lemery*, of 1733, was published, the distinction between them was well established. This author has stated that the first is preferable to the second, and is "clean, light, tender, friable, resinous, grey, easily reduced to an ash-grey powder, of a stale, disagreeable odour, and a taste a little bitter;" the latter is "more close or compact, heavier, blacker, less resinous, breaking with difficulty, less grey in powder, and whitening less the liquor in which it is dissolved." It is evident from the perusal of the description given by Lemery, of the Aleppo kind, and a comparison of it with that presently to be presented of *Virgin scammony*, that the same substance is referred to. The writers of drugs of nearly the same date, (the middle of the eighteenth century) as Tournefort, Lewis and Pomet, describe the article in the same terms, and contrast it with Smyrna scammony. In the course of time, the application of the name Aleppo was made to an article of infinitely inferior quality, fabricated from the pure drug, and sufficiently differing from Smyrna to maintain the impression that it was genuine.

The question now arises, why was there a difference between the two varieties just noticed? It is agreed by all authorities from Dioscorides of ancient date, to Russel in modern times, that the best, the purest product, is the result of natural exudation from the root of the plant; the description given by these writers with an interval of sixteen centuries closely correspond. Mesue, the younger, who flourished during the tenth century, an Arabian, and consequently well instructed, informs us, however, that this was not the only method, three others being mentioned, viz., by heating the root, by bruising it and compressing the juices, and by performing the same operation on the

leaves and stems. An inferior article will be thus produced. We are forced then to admit this explanation, or to assume one, which Lindley states he doubts, to wit, that the Smyrna article was the product of a different plant, (*Periploca secamone*,) this, exclusive of other reasons, (as the article has disappeared, and given place to factitious preparations,) is hardly tenable.

It has been stated that the distinction between Aleppo and Smyrna scammony has been of late years abandoned. This has been occasioned by investigations in which the English pharmacologists more particularly have been successful, and which have resulted in the disclosure of practices which most probably had long existed, but to which attention had not been directed. Smyrna is the port of shipment; to this place the pure scammony is taken in a soft state, and there fabricated to suit purchasers, according to a tariff of prices. The individuals are called scammony makers, and, as I have been informed by an intelligent dealer,* prepare a mixture of impurities, with which the scammony is commingled. As this stands, the mixture assumes the form of strata of various strengths, the greater levity of the scammony keeping it towards the top, while the heavier impurities settle to the bottom. From such preparation, the several qualities of the article are skimmed and formed by evaporation; hence, the terms first, second and third sorts. *Virgin scammony* and these sorts constitute the article of commerce. The admixture of foreign substances was an old practice, for Dioscorides, in preferring the Mysian article to those of Syria and Judea, states as a reason that the latter were adulterated with tithemalus and the farina of the orobus.

Virgin scammony in this market is at present comparatively unknown; formerly, from the statements of the older druggists, it was common; let us then exhibit its qualities and value. The name *Virgin*, is that

* A gentleman of Boston.

employed by Pereira, Christison, and Royle; it is called *Scammonée d'Alep superieure*, by Guibourt, and simply *Scammonée d'Alep*, by Fee. The following are the characteristics: Fragments irregular, apparently portions of larger masses; rough, worn, and ash-coloured externally, or as if covered with a greyish powder; friable, breaking between the fingers, or with the nail; fracture resinous, presenting shining greenish black surfaces, with here and there small cavities and greyish crevices; the thin fragments semi-transparent. Structure compact and light; becoming whitish by the application of moisture and friction, or in the mouth; having a peculiar taste like cooked butter, without bitterness, but a little acridity slowly developed, the odour being disagreeable, cheese-like, sp. gr. 1.2. The exterior coat effervesces with muriated acid, probably from the mass having, when soft, been rolled in chalk; there is no reaction with iodine, and it takes fire readily, burning with a yellow flame. Dr. Christison states that this kind is almost all soluble in boiling rectified spirits; and sulphuric ether takes up at least 77 per cent., indeed 82 or 83 per cent. if the specimen be tolerably dry. It breaks down readily in water, forming a smooth but not permanent emulsion. Several analyses have been made; those of the eminent Edinburgh pharmacologist are particularly worthy of notice. We shall give such as are important.

Christison.

	1. Old Scammony.	2. Old Scammony.
Resin, . .	81.8	83.0
Gum, . .	6.0	8.0
Starch, . .	1.0	0.0
Fibre and sand, .	3.5	3.2
Water, . .	7.7	7.2
	100.00 grs.	101.4
Gain probably in water,		1.4
		100.00

Guibourt.

Resin,	75.
Alcoholic ext.	6.25
Gum ext.	3.12
Insoluble vegetable matter,	7.25
Earths,	8.38
	100

Marquat's analysis is more minute and elaborate; it may be consulted in Pereria's Materia Medica. It may be stated that one specimen gave him 81.25 of resin, another 78.5, corresponding, the first, nearly to Christison, the second to Guibourt.

Virgin Scammony. Two specimens have come under my observation.

The first corresponds to the description given of virgin scammony. Its sp. grav. is 1.3. From it were obtained:

Resin,	70.00
Aqueous extract,	3.75
Earthy matter,	5.00
Veg. mat. destructible	20.00
Loss,	1.25
	100.00

The residuum from alcohol was of a greenish-brown colour, the residuum from water had nearly the same appearance; both were pulverulent. The resin was of a dirty greenish-brown colour. It affords slight effervescence with muriatic acid, and does not change with iodine. This specimen was imported from London.

The second is more covered with ash-coloured powder, and in mass has a duller aspect. Sp. gr. 1.3. From it were obtained:

Resin, . . .	65.00
Aq. ext. . . .	4.00
Earthy matter, . .	4.25
Veg. matter, destructible, .	23.50
Loss, . . .	3.25
	100.00

It slightly effervesces with muriatic acid, and changes decidedly to blue with iodine. The alcoholic residuum had a brown ash colour; was disposed to cake when dried in the capsule. When exhausted by water, it presented a lighter colour and was pulverulent.

The *resin* was transparent, and of a brown colour. The dried *aqueous extract* was of a deep, clear brown colour, in powder glistening; entirely soluble and without taste.

The specimen was obtained from New York.

It is evident from the result of these experiments, that the two specimens examined, are inferior to those of Christison or Guibourt. The second specimen corresponds to the "*second scammony in amorphous*" pieces of Pereira.

Scammony in large regular masses. (Factitious.)
Chalky and Amylaceous.

The first specimen of the kind is in plano-convex cakes, four inches in diameter, an inch and a quarter thick, corrugated on the surface, between the corrugations smooth. It breaks with more difficulty than the preceding, but is brittle. The fractured surface has a deep greenish (olive) gray appearance, somewhat resinous; masses of resin appearing in detached patches; the exposed surface becoming uniformly darker. It is somewhat porous, the pores minute, with here and there shining points or cavities. In mass it gives the idea of sap sago cheese. No translucency of the edges. The powder is green ash coloured. Odour of cheese

marked. Taste marked and disagreeable. It cakes in the mouth and forms a slight emulsion. When rubbed with the moistened finger, affords some milkiness. It contains

Resin,	40.50
Aqueous Extract,	9.00
Earthy Matter,	6.00
Vegetable Matter,	32.00
Loss,	12.50
	100.00

It slightly effervesces with muriatic acid, (chalk) and is deeply turned blue by iodine, (starch.)

The specimen was imported in 1836. It corresponds, I think, with "*β. Second Scammony*" of Pereira. At present I can find none of it in the market.

It is the article described at page 643, U. S. Dispensatory, ed., 1846.

The second specimen, in form, resembled the preceding; it is in plano-convex cakes, five to six inches in diameter, and in thickness, one and a quarter to one and a half inches. The exterior is rough and dirty ash brown; the fractured surface is dull, but in a clear light presents very minute shining particles; it is greenish brown, presenting white chalky points, and pores. The consistence is firm, a little force being necessary to reduce it to powder; powder, ash brown, rather than green. It has a cheesy odour; a disagreeable taste, and forms an emulsion in the mouth; it is somewhat gritty between the teeth. It contains

Resin,	45.00
Aqueous ext. (gum.)	7.50
Earthy matter,	12.50
Veg. matter, destructible,	30.00
Loss,	5.00
	100.00

It effervesces briskly with muriatic acid, and is turned

blue by iodine. The inference is therefore that the earthy matter is chalk, and the vegetable matter starch. Of this kind I have found two small lots in the market, the remnants of those imported several years since. It corresponds to the "third quality" scammony of Pereira, but yet is as good as the preceding.

The third specimen I have is in masses, six inches long, four wide, and one and a half thick, rounded at the extremities; plano-convex, and divided into two parts on the convex surface by a deep fissure, running the length of the cake. Externally it is rough looking, of an ash white and slate appearance; internally it presents a speckled, deep ash hue; no resinous aspect on fracture. It is porous, friable, and readily reduced to powder; powder light ash. It has a slight cheesy odour and a chalky taste.

It is too dry to produce an emulsion by rubbing with the moistened finger. It contains

Resin, ...	27.00
Aqueous ext., . . .	5.00
Earthy matter, . . .	6.25
Veg. mat., destructible, . .	58.75
Loss, ...	3.00
	100.00

It effervesces briskly with muriatic acid, and is turned blue with tinct. iodine. This article came from New York.*

Amylaceous Scammony.

This scammony is in eliptiform masses, five or six inches in length, and four inches wide, and an inch thick; like the preceding, it is flat on one side, convex on the other, and divided on the convex surface by a deep depression running the length of the mass, and extending half through its thickness. The edges are uniformly rounded. It is of a

* Since this paper was written I have seen a specimen of the same variety in small round plano-convex cakes.

light ash colour, as if rubbed on one surface; dark slate, slightly polished on the other. It breaks with a short fracture, presenting a pretty uniform surface, darker towards the edge or outer portion, and uniformly light slate coloured in the centre. Its structure is homogeneous and dense, with few and very minute elongated pores. A few white points are perceptible on minute examination, and here and there exceedingly minute shining particles. It breaks down like starch that has been wet and dried, affording a uniform ash powder. It has a rancid cheese-like odour, and a nauseous rancid, somewhat bitter taste. It contains

Resin, ...	22.
Aq. ext. . . .	7.00
Earthy matter, . .	2.50
Veg. mat., destructible, .	60.00
Loss and water, . .	8.50
	100.00

It produces a deep blue with iodine, and effervesces with muriatic acid. This specimen was derived from New York.

Gummy Scammony.

In cakes or masses doubly convex, six inches wide and one and a half inches thick, polished and dark brown externally, internally greyish brown, hard, horny, homogeneous, with great difficulty broken, fracture rough, edge of fracture semi-transparent, odour decided, somewhat gritty to the teeth, gummy to the taste, rendering the saliva viscid but not opaque, shining and sticky when moistened; when rubbed with the finger giving a tenacious mucilage, dirty but not milky; powder dirty gray; with great difficulty reduced to powder. It contains

Resin, ...	13.00
Aq. ext. . . .	35.00 grs.
Earthy matter, . .	10.00
Veg. matter, destructible, .	37.50
Loss, ...	4.50
	100.00

The constituent of which the greater part of this is made, is soluble and insoluble gum, which I presume to be gum tragacanth from its behaviour with water. It slightly effervesces with muriatic acid, and is changed to a brown with a slight tinge of blue by iodine. This specimen was obtained from Boston. Considerable quantities are in the market.

Another specimen in similar sized and shaped masses, presents a rough earthy surface; it is lighter coloured internally than the preceding, and breaks with a horny rough fracture. It has a decided odour, is mucilaginous and bitter to the taste, somewhat gritty to the teeth, and forms with moisture on the finger a viscid clear mucilage. With water it dissolves, becoming a gruel-like viscid substance.

It contains—Resin, 6.00. The remainder as above. This article is offered as prime scammony, and I have seen it in several forms and in quantity in the market.

Black Gummy Scammony.

The specimens I have examined of this kind had the form of the preceding; externally they are of a plumbago colour, internally iron grey. They are heavy, hard, difficult to reduce to powder, which is dark. Odour slight, and taste viscid and gritty. From one of the specimens I obtained ten per cent. of resin. The residue seemed to be made up of tragacanth and bone black, the latter substance existing in patches unmixed in a second specimen. This scammony is in the market in large quantities.

Factitious Smyrna Scammony.

Two specimens of this I have met with. It corresponds to the description given of it by Pereira. "It is blackish and has externally a slaty appearance. It breaks with difficulty, its fracture is dull and black. Its sp. gr. 1.412. Moistened and rubbed it evolves the smell of guaiacum. Boiled with water it yields a turbid liquor, (which is not rendered blue by iodine,) and deposits a black powder; the

latter boiled with alcohol, yields a solution which becomes greenish blue on the addition of nitric acid, showing the presence of guaiacum." The specimens I have met with are in half cakes.

Montpelier Scammony.

This article is common in this market. It is well described at page 645 of the U. S. Dispensatory, ed. 1846.

Upon reviewing our investigations, it will be found that the same range of varieties has been exhibited as that presented by Christison, but there is a marked inferiority even with the best of them, as compared with his specimens. The kind chiefly composed of gum, is new so far as I have met with any account of it, and as it is plentiful, indeed the most common in our market, druggists should be on the alert to reject it.

There are certain properties which have been depended on in judging of the quality of scammony, these are the odour and taste, and the kind of solution which is produced by wetting and rubbing it. The odour is as decidedly cheesy and disagreeable in the worst specimens as the best, if not more so, and the taste is mucilaginous and nauseous, so much so, as to induce the belief that they are produced artificially ; and with respect to the milky solution, it must be apparent, that a mixture containing gummy compounds will undergo the same change by the operation usually practised. In fact there is no mode of determining the value of the adulterated article, except by the examination of its constituents.

In concluding the subject it may be remarked, that unless some decided stand is taken by the consumers of this drug, it would be as well to abandon it. The article is worthless as it exists in the market, serving to contaminate the preparations into which it enters, rather than afford to

them an increase of efficacy. The pure drug has in ancient times been called, to distinguish it, "the purgative," and more recently "one of the pillars of physic," titles which in our day and our own city, may properly be changed to *the opprobium of pharmacy*.

ART. II.—ON CALISAYA EXTRACT.

By Charles Ellis.

The object of this notice is to induce an examination and trial of a preparation from the Calisaya Bark, which may perhaps be found to be a valuable addition to the list of medicinal agents.

The residuary product left after the crystallization of sulphate of quinia, known by the name of impure sulphate of quinia, extract of quinia, and precipitated extract of bark, has long been employed in this country as a remedy in intermittent fevers. It is analogous to chinoidine and contains amorphous quinine, an interesting article upon which, from the pen of Baron Liebig, was published in Vol. 18, No. 3, of the American Journal of Pharmacy. According to this writer, the chief constituent of chinoidine bears the same relation to quinia that uncrystalline sugar does to crystalline, in fact that it is amorphous quinine. These facts are sufficient to show that the calisaya bark (Cinchona flava) has other constituents, besides its crystallizable alkaloids, of too much importance to be overlooked.

The article under notice, containing as it does, all the quinia and cinchonia in the bark, must necessarily be a more valuable preparation, than one from which those important

vegetable alkalies have been separated by crystallization, so far as is usually the case in the manufacture of sulphate of quinia.

The frequent demand for an extract of calisaya bark, upon which reliance may be placed when administered in small doses, and the preference often given to it by physicians, over the sulphate of quinia, are sufficient reasons, without any claim to novelty, for introducing such a preparation through the pages of our Journal. In order to distinguish it from the officinal *Extract: Cinchonæ*, as well as from the residuary product alluded to above, the name of Calisaya Extract (Extractum Calisayacum) is proposed.

The following is the mode of preparing it.

The Calisaya Bark (Cinchona flava) finely bruised two pounds, boil in a gallon of water acidulated with f.ʒss. Acid Hydrochloric; strain and boil the residue in two successive portions of water, of one gallon each, with a similar quantity of acid. To these decoctions mixed together, add about ʒij. or a sufficient quantity of lime, previously reduced to powder by the addition of water. Stir the mixture well, and set it aside until precipitation ceases to take place.

This precipitate being strained off, is to be well washed with water, dried and digested in hot alcohol, until all the taste has been exhausted; then distil off the alcohol, and carefully evaporate the product over a water bath to a pilular consistence.

This extract will contain the quinia, the cinchona, and all that can possess any medical value in the bark. It will be found to be intensely bitter, and if a selection of the true calisaya bark has been made, it is believed that the product thus obtained, will prove a very efficient remedy, in doses but little larger than those in which the sulphate of quinia is usually administered.

The proximate principles of the bark will remain in this preparation, in the state of alkaloids, uncombined with acid

which is thought preferable for the more common mode of administration in pills. If a solution is wanted, the addition of a few drops of sulphuric acid will assist in rendering it entirely soluble in water, and will convert the vegetable alkalies into sulphates.

It may be given in doses of from one to four grains; medium dose two grains, and is applicable to the same character and form of disease in which bark in substance, and the sulphate of quinia, are usually administered.

ART. III.—ON SUBNITRATE OF BISMUTH.

By Emil Nollenberger,
Apothecary, U. S. Naval Hospital, New York.

Mr. Turner, of London, manufacturer of Pharmaceutical preparations, requested me, during my residence there, to undertake some experiments on the cheapest and most practical methods of preparing subnitrate of bismuth in a pure and white state. The following process gave me the most satisfaction, by yielding a preparation of splendid whiteness and purity.

I weighed four parts of pure nitric acid, spec. gr. 1.20, in a glass jar and put a porcelain funnel, which was pierced with small holes, in the jar, so as to reach about two inches under the surface of the acid, I then put one part of granulated bismuth in the funnel, and put the whole apparatus in a moderately warm place till all the bismuth was dissolved. (It is necessary to put it aside somewhere that the nitrous acid may do no harm.) When all was dissolved, I diluted the solution with as much distilled water as it

would bear without getting turbid, and filtered through doubled paper. To the filtered liquor I added for one pound of metal, one ounce of nitric acid, evaporated in a porcelain dish very slowly, and crystallized while cooling. After having dried the crystals, I dissolved them again with the aid of a little heat in two and a half parts distilled water, filtered the liquor and poured it, constantly stirring with a glass rod, in twenty-four parts boiling distilled water, suffered the precipitate to settle at the bottom of the vessel, drew off the supernatant liquor with a glass syphon, and again poured hot distilled water upon it, repeating that operation three or four times more. I then collected the precipitate on a filter, washed it yet several times with distilled water, and dried it at last on paper spread over a slate of plaster of Paris. The precipitate was of a beautiful white, nearly as much in weight as the metal used, and quite free from arsenic, while the metal I used contained a considerable quantity of it, because the arseniate of bismuth which is formed by the solution of the metal in nitric acid, remained after the filtration of the solution of nitrate of bismuth.

ART. IV.—ON PREPARING PURE CUBEBIN.

By Emil Nollenberger.

Apothecary, U. S. Naval Hospital, New York.

Wishing to prepare pure Cubebin in large quantities, I tried many experiments to find out the cheapest and most practical mode. The following I found to answer best.

The cubebs are first coarsely powdered and macerated with a sufficient quantity of water in a copper still for twenty-four hours, then distilled as long as volatile oil passes over. After drying the residue, it is exhausted with alcohol, spec. gr. 0.85; the tincture is then put in a still and the alcohol driven over. The resinous matter which remains in the still is put aside for several days, till it forms a mass of crystals, which are placed on a strainer where the soft resin is almost entirely separated. The remainder on the strainer is dissolved in three or four times its weight of boiling alcohol, spec. gr. 0.90, and the supernatant portion decanted while warm, from the precipitated resin, when upon cooling the cubebin crystallizes. By dissolving it again in hot strong alcohol and filtering it through animal charcoal, it is obtained in beautiful white, needle-shaped crystals.

REVIEW.

ART. V.—GRAY'S SUPPLEMENT TO THE PHARMACOPŒIA; BEING A CONCISE BUT COMPREHENSIVE DISPENSATORY AND MANUAL OF FACTS AND FORMULÆ FOR THE CHEMIST AND DRUGGIST, AND MEDICAL PRACTITIONER. ENTIRELY RE-WRITTEN, RE-ARRANGED, AND CONSIDERABLY ENLARGED. By THEOPHILUS REDWOOD, Professor of Pharmacy to the Pharmaceutical Society of Great Britain. London. Longman & Co. &c. 1847. pp. 1118.

THOSE who are acquainted with the "Supplement" of Mr. Gray, as published in 1836, and anterior, will remember it as a curious mixture of important pharmaceutical facts, and rubbish, with but few claims to a regular treatise on pharmacy. The object of the writer was apparently to bring before his readers the greatest number of formulæ and statements, without much care as to their value or truth; in many giving recipes for adulterations, and thus encouraging the already existing proneness to sophisticate medicines.

The "Supplement," nevertheless, proved a valuable work of reference to the dispensing apothecary, from its being a kind of encyclopedia of recipes, synonyms, plants, etc., which the very copious index presented in a lucid arrangement, and doubtless was completely adapted to the state of pharmacy in England at the time it was written.

With a knowledge of all this, it was with pleasure that we read the announcement of a new edition, under the auspices of Mr. Redwood, and flattered ourselves that he would model the work into a regular treatise on pharmacy, as well as prune it of the trashy portion. We have therefore, with some regret, found that the present work presents no claims to a scientific compend, but retains the general

features of the earlier editions, with the very striking difference that the objectionable recipes have been omitted, an alphabetical arrangement adopted in the formulary, and the arrangements of Cuvier and De Candolle applied to the extended catalogue of animals and plants used in medicine.

The first hundred pages are devoted to weights and measures, specific gravity, thermometrical tables, tables of solubility, pharmaceutical calendar, &c.

The following five hundred pages are taken up with a catalogue of animals and plants, arranged according to the natural systems, including all that are in the remotest manner connected with medicine, and many that have no claims to such a position. The majority of them are merely noticed, whilst those that are more important are somewhat enlarged upon. As the vulgar names and scientific synonyms are given, this catalogue affords a valuable reference in the constantly recurring queries after herbs, etc., under local names.

The remaining four hundred pages are occupied with formulæ, occupied with short descriptions of substances, the whole arranged in alphabetical order. The formulary includes all the preparations of the British Pharmacopœias, those of our own not recognized in England; many from the French Codex and other French authorities, besides very many preparations not officinal, though used occasionally. Besides these, the patent medicines, veterinary medicines, enamels, varnishes, inks, cements, essences, etc., etc, are fully represented, and present an array of information not found in any similar work.

The index is exceedingly copious, occupying near one hundred pages, of three columns each, and embracing over fifteen thousand references. On the whole, we cannot but admit that the editor has acquitted himself well of the task proposed in the preface, viz: "to fulfil the objects contemplated by the original author," and that the work before us

is a very decided improvement on its predecessor. We the more readily concede this, as the editor was required to preserve the general form of the original work; and more especially because he, in conjunction with Professor Mohr, of Germany, is about to present us with a scientific work on Practical Pharmacy, which will not, we hope, be modeled after the "Supplement."

The following extracts from the work will enable the reader to infer its character more correctly.

"DRYMIS (De Cand. i. 78.)

DRIMYS GRANATENSIS.

DRIMYS MAGNOLIÆFOLIA, and two other species not well known (America;) bark, slightly bitter, very acrid, heating and aromatic.

DRIMYS WINTERI. *Winterana Aromatica.* America.

Bark, *Cortex Winteranus, Winter's cinnamon,* Winter's bark, thick, channelled across on the outside, grey, much cracked on the inside, solid, iron-grey, sharp tasted, aromatic, very fragrant; used in scurvy, vomiting and palsy. Rare at present, being not in such esteem as *Canella Alba.*"

"ÆTHER CHLORICUS. *Chloric Ether. Chloroform. Terchloride of Carbon.*

These names have severally been applied to a liquid having an ethereal smell, obtained by the distillation of a mixture of weak spirit and chloride of lime.

R.	Chloride of lime in powder, - - -	*lbs.* iv.
	Water, - - - - - -	*lbs.* xij.
	Rectified spirit, (alcohol,) - - -	f.℥xij.

Mix in a capacious retort or still, and distil as long as a dense liquid, which sinks in the water with which it comes over, is produced. *Dumas.*

This process is attended with some danger from the swelling up of the ingredients when heat is applied. The product obtained by the above process should be rectified by agitating it with several portions of strong oil of vitriol,

and afterwards distilling it from carbonate of baryta. When pure it is a dense liquid, having a specific gravity of 1.480, and a sweet taste. Its composition is C^2 H Cl^3. This is chloroform. It is soluble in alcohol, and in this form it is usually employed in medicine; the liquid sold as chloric ether being a mixture of the product above described, with about six or eight parts of rectified spirit."

[This is not the hydrochloric, or muriatic ether of the shops, but the substance now recommended by Dr. Simpson as a substitute for sulphuric ether for inhalation.]

"FERRI ET QUINIÆ CITRAS. *Citrate of Iron and Quinia.*

℞.		
Crystallized citric acid,	.	9 parts
Clean iron filings,	. .	3 "
Quinia,	. . .	1 "
Water,	. . .	q. s.

Dissolve the acid in twice its weight of water, add the iron and apply a gentle heat until combination is effected; then add the quinine, continue the application of heat for some minutes, filter the solution and evaporate to dryness; dissolve the residue in distilled water, and evaporate the solution with a gentle heat to a syrupy consistence; spread this out on earthen plates and dry it in a stove. When dry it separates from the plates in scales."

[This formula differs from that in use here both in the proportion of quinia to citrate of iron, and in the state of oxidation of the iron. The most usual proportion is five parts of citrate of sesqui-oxide of iron and one part citrate of quinia.]

"FUMIGATIO PICIS LIQUIDÆ. *Tar fumigation.*

Put one part of tar and four or five parts of water in a pipkin, or any convenient vessel, and boil it in the apartment of the patient, allowing the vapour to escape in the room."

Oil of Tar in small quantity is advantageously substituted for tar.

"*Moxons' effervescent Magnesia.*

℞.	Carbonate of magnesia, . .	℥j.
	Sulphate of magnesia, . .	℥ij.
	Bi-carbonate of soda, . .	℥ij.
	Tartrate of potash and soda, .	℥ij.
	Tartaric acid, . . .	℥ij.

To be perfectly freed from water of crystallization, and mixed and kept in a well-corked bottle."

"PASTA AMYGDALARUM. *Almond Paste.* As a cosmetic for the hands, &c.

℞.	Sweet almonds blanched, .	*lbs.* iss.
	Rice powder, . . .	
	Orris root powder, *aa.* . .	℥iv.
	Spermaceti, ...	℥ss.
	Oil of almonds, . . .	℥ij.
	Windsor soap, . . .	℥ij.
	Oil of bitter almonds, . .	j℥.
	Oil of bergamot, . . .	ʒiij.
	Otto of roses, . . .	ʒss.
	Rose water, ...	q. s.

Beat the almonds into a paste with the rice powder, orris powder, and a sufficient quantity of the rose water. Melt the spermaceti, oil of almonds, and soap together, and beat up with the other ingredients so as to form a paste."

"POMADE DIVINE.

Washed and purified beef marrow, .	*lbs.* ij.
Storax, cypress wood, orris root powder, *aa*	℥ij.
Cinnamon powder, ...	℥j.
Cloves and nutmegs, *aa.* . . .	ʒss.

Keep them melted by the heat of boiling water for six hours, then strain through flannel."

"RED SEALING WAX, (best.)

℞.	Shellac, ...	*lbs.* ij.
	Venice turpentine, . .	*lbs.* j.
	Vermillion, or Best di-chromate of lead,	*lbs.* iss.

Melt the shellac and turpentine together, and stir in the pigment as the mixture cools."

"SUCCI EXPRESSI. *Expressed juices. Preserved juices.*

Under this name a class of preparations have been introduced into this country [England] by Mr. Squire. They are made by expressing the juices from plants, at the period of their growth when they possess the greatest amount of medicinal activity; mixing these juices with half their volume of rectified spirit, allowing the mixture to stand for a short time and then filtering. In this manner the following are made:—Preserved juices of *wormwood*, *aconite*, *conium*, *digitalis*, *hyoscyamus*, *lettuce*, *dandelion*, *&c.*

Interspersed with the more valuable formulæ from which the above have been selected, are many curious specimens in the way of recipes, among which may be found directions for preparing gingerbread, mint juleps, sherry coblers, milk punch, boot blacking, horse medicines, bread, artificial gems, candies, artificial mineral waters, and perfumed waters. With the latter is the following curious account of the old Hungary water.

"AQUA HUNGARICA. *Hungary water.*

The following is the formula preserved in the Imperial Library at Vienna, said to be in the hand-writing of Elizabeth, Queen of Hungary, (or Langravine of Thuringia,) 1235.

'I, Elizabeth, Queen of Hungary, being very infirm and much troubled with the gout in the seventy-second year of my age, used for a year this receipt, given by an ancient

hermit, whom I never saw before nor since; and was not only cured, but recovered my strength, and appeared to all so remarkably beautiful that the King of Poland asked me in marriage, he being a widower and I a widow. I, however, refused him for the love of my Lord Jesus Christ, from one of whose angels I believe I received the remedy. The recipe is as follows:—℞. Aqua vitæ four times distilled, three parts; and the tops of flowers of rosemary two parts. Put these in a close vessel and let them stand fifty hours in a gentle heat, and then distil them. Take ʒj. of this in the morning once every week, and let your face and diseased limb be washed with it every morning.'"

P.

ART. VI.—ACCOUNT OF A NEW ANÆSTHETIC AGENT, AS A SUBSTITUTE FOR SULPHURIC ETHER IN SURGERY AND MIDWIFERY. By J. Y. Simpson, M. D., F. R. S. E., Professor of Midwifery in the University of Edinburgh, Physician-Accoucher to the Queen in Scotland, &c. 8vo. pp. 21. Edinburgh: 1847.

We gather from this pamphlet that its author, Dr. Simpson, on the 10th November, 1847, communicated to the Medico-Chirurgical Society of Edinburgh, the substance of the present publication, the title of which is given above.

After experimenting with various articles for the purpose of discovering a substitute for sulphuric ether, Mr. Waldie suggested that the perchloride of formyle was worthy of a trial.

Chloroform, or perchloride of formyle, after having tried

it in about fifty cases, Dr. Simpson thinks is far superior to sulphuric ether as an anæsthetic agent. Three cases of surgical operations performed under the influence of chloroform are detailed.

The advantages of chloroform over sulphuric ether, Dr. Simpson alleges, are:

1. A much less quantity is required; from a hundred to one hundred and twenty drops of chloroform being sufficient to render the patient insensible to pain.

2. Its action is more persistent, and is more promptly induced; from ten to twenty inspirations being sufficient.

3. Those who have inhaled both, declare that the inhalation of chloroform is more agreeable than that of sulphuric ether.

4. Chloroform is cheaper than sulphuric ether.

5. Its odour is agreeable, and does not long adhere to the clothes like that of sulphuric ether; and it is more portable than the ether because a smaller quantity is required.

6. It is exhibited without an apparatus, being dropped simply into a hollow sponge, or into a handkerchief, after giving it a cup-like form, and the sponge or handkerchief is then applied to the mouth and nose gradually.

7. Nothing unpleasant has resulted from the trials thus far made with chloroform.

"The preparation which I have employed was made according to the following formula of Dumas:—

℞ Chloride of lime in powder, - *lbs.* iv.
Water, - - - - *lbs.* xii.
Rectified spirit, - - - f.℥xii.

Mix in a capacious retort or still, and distil as long as a dense liquid, which sinks in the water with which it comes over, is produced." (Gray's *Supplement to the Pharmacopœia*, 1846, p. 633.)

"The *perchloride of formyle*, Fo. $Cl_3 = C_2 H, Cl_3$ is also produced from a compound of the ethyle series, namely,

from chloral, by the action of alkalies. It is an oily liquid of a sweet taste and etheral smell. When acted on by alkalies, it yields chlorides and formiates." (Gregory—*Outlines of Organic Chemistry*, p. 401.)

The chemical constitutions of the three articles, which, by inhalation, induce insensibility, are remarkable, because of their wide difference; namely,

Nitrous Oxide, = N. O.
Sulphuric ether, = C_4 H_5 O
Chloroform, C_2 H. Cl_3

Since Dr. Simpson's pamphlet was published, several experiments have been made in England, confirming the opinion expressed by the author.

NOTE.—Chloroform was first discovered by Mr. Gurthrie, of Sackett's Harbor, N. Y., and afterwards by Soubeiran. See a paper by Daniel B. Smith, of this city, in Vol. iv., p. 114, of this Journal.

R.

ART. VII.—ON THE PURIFICATION OF SULPHURIC ACID, AND THE DISTILLATION OF LIQUIDS IN GENERAL.

BY M. LEMBERT.

SULPHURIC acid is, of all the re-agents, the most frequently employed in the laboratory, and yet it is but seldom found in a state of purity. This arises from the difficulty and even danger that attends its purification, especially if a large quantity be operated on. As met with in commerce, it is generally very impure, and it is difficult to distil a few pounds, or even a smaller quantity of it, without the retort being broken by the bumping which arises from the vapour being formed with less facility in vessels having a smooth surface, from the density and consistence of the liquid, or from the high temperature at which it enters into ebullition, as well as from the liquid being a bad conductor of heat.

It has been proposed to introduce into the retort, pieces of glass, strips of platinum, &c. Some have recommended to apply the heat only to the upper part of the liquid, but these methods I find by experience do not accomplish the object desired. I have endeavoured to discover some plan capable of facilitating the formation and the disengagement of the vapour, and the following I find to succeed the best:

1. I introduce into the retort some pieces of *Quarzite*, a variety of granulated quartz, resulting from the conglomeration of particles of that substance, probably under the influence of a high temperature. It is important to choose this variety, the others giving far less satisfactory results. The shape of the pieces is by no means a matter of indifference, with reference to the success of the process. I have remarked in a great number of distillations, that the fragments obtained by striking on the edge of a former cleavage, facilitates the distillation better than very thick pieces. The number as well as the size of the pieces, must also be observed. If they are too small, and in too small a quantity, the bumping may occur, because the fragments are easily lifted by the vapour which is disengaged, consequently, the bottom of the retort being no longer covered with the siliceous substance, assumes the condition of a smooth vessel, and the vapour is produced with difficulty. If they be small, and in too great quantity, the ebullition is irregular, bumping occurs without ebullition, bursts of vapour take place at intervals, the liquid rises in the retort, and if the latter be rather full, it may pass over into the neck. The fragments should be at least a *centimetre* (one-third of an inch) in length, for the operation to succeed well. I use them generally as large as the neck of the retort will allow. Ten or twelve scales of *quarzite* of this size are sufficient to distil readily several pounds of acid. It is well to cover the retort, that is to say, to distil in a reverberatory

furnace, furnished with a dome; without this precaution, the distillation would proceed very slowly, although the ebullition might be very brisk, because the vapour of sulphuric acid being very heavy, and only existing at a high temperature, would condense before reaching the neck of the retort.

This process, which is very simple, is especially advantageous, since it may be applied to the distillation of many other liquids. In fact, the substance employed to facilitate the ebullition, is unalterable by nearly all chemical agents, and for the last three of four years, since I have discovered it, I have employed it in nearly all my distillations.

2. In the process just described, the quarzite acts by its numerous rough surfaces in facilitating the formation of the vapour; but theory shows that the same result might be obtained, that is, the distillation without bumping, if the acid could be made a good, or at least a better conductor of heat; and this point I think may be thus arrived at:—

Sulphate of potash, and dry sulphate of soda dissolve readily in sulphuric acid, especially when aided by a gentle heat. This solution appears to conduct heat very well, and boils without bumping, provided there be not too great a quantity of sulphuric acid in proportion to the sulphate. I proceed thus:—I put into a retort the sulphuric acid which I wish to distil, and add to it from 150 to 200 grammes of sulphate of potash or soda for every killogramme of acid (from two to three ounces to the pound avoirdupois) and then distil as already stated. I collect two-thirds or three-fourths at most of the acid, and if I wish more, I add fresh acid, and recommence the distillation. When the process is terminated, I allow the retort to cool, and stop it up to be kept for subsequent use. I have said that I do not collect more than three-fourths of the acid originally put into the retort, and for these reasons:—In the first place, the mixture boils at a higher temperature than the boiling point of sul-

phuric acid, and the temperature arises in proportion as the solution becomes more concentrated. If it be concentrated too much, that is, if too much acid be distilled off, there would soon remain little more than the bisulphate, and, under these circumstances, the glass would be softened. The softening of the glass occurs even at an earlier stage of the process than this. In the second place, this solution of sulphate, or rather of bisulphate of potash in sulphuric acid, becomes less fusible in proportion as it contains less acid, and when the retort is to be again used, the risk of breaking it is incurred in effecting the fusion of the solid mass.

3. Of these two processes, I prefer the first; and although it may be sufficiently efficacious, since those to whom I have shown it, and who have practised it, have been astonished at the facility with which the acid distils by this method, yet the process may be rendered more easy still by combining the two, that is to say, by putting into the cucurbit, both the sulphate and the *quarzite*. Then, except the elevation of temperature, the sulphuric acid boils as easily, and with as much regularity, as water.

It is well not to distil the sulphuric acid too many times on the same *quarzite*, for the rough edges are blunted, a very fine powder is separated, which floats in the liquid, and after the lapse of a certain time, it no longer produces the same effect. Then, if the latter method be adopted, we must not wait until the residue of the distillation is quite cold before adding fresh acid, because the pieces of *quarzite* which would remain in the solid mass could not be changed. To effect this, it is necessary to add the acid before the refrigeration is complete, to decant the liquid, take out the quarzite, and return the solution into the retort, in readiness for another operation, after having added to it some fresh pieces of the substance mentioned. The retort also should not be too full, and should be placed, if possible, in such a

position, that the first part of the neck may incline towards the body of the retort.

The reason of this, which is an observation applicable to the distillation of liquids generally, is, that when a liquid is in a state of ebullition, if it be looked at horizontally at the level of the surface, small drops are sometimes seen projected above the surface, forming curves of greater or less extension. All liquids, in boiling, do not exhibit this phenomenon; but as sulphuric acid does, it follows, consequently, that during the operation, and especially if the retort be too full, a great number of these drops are thrown into that part of the neck which is near the body of the cucurbit. This part of the neck should, therefore, be inclined in such a manner, as to favour the return of these drops into the cucurbit, which, without this precaution, would run over, and mixing with the distilled liquid, render it impure. Currents of cold air, also, cannot be too much guarded against, which otherwise striking against the neck of the retort, would be likely to cause a fracture. Every time that my retorts have been broken in distilling sulphuric acid, the accident has happened in this way.—*Pharm. Journ., from Journ. de Pharm.*

ART. VIII.—ON QUINOIDINE.

By Dr. F. L. Winckler.

In the year 1843, the author discovered that commercial quinoidine contained, besides more or less cinchonia and quinia, also a very large proportion of an alkaloid which was apparently in combination with two different coloured, amorphous, resinous substances. This alkaloid was amorphous, and yielded only amorphous salts; but in other respects it did not differ from quinia, and had exactly the same combining weight as the latter. The author therefore recommended it to be purified and employed as amorphous quinia in the same way as common quinia. He is, however, of opinion, that Liebig (who has recently proved by ultimate analysis, that these two bodies have the same composition) overvalues the importance of quinoidine. Dr. Winckler obtained from eight ounces of crude quinoidine, only three ounces of pure, white, amorphous quinine, so that no great pecuniary advantage can be derived from it; whilst, on the other hand, the crude, and certainly cheap quinoidine should not be employed, on account of its variable composition, and its liability to adulteration.

Crude quinoidine having such a variable composition, cannot always be obtained pure in the usual way, by dissolving it in alcohol, ether, acids, &c.; the author tried, therefore, to destroy the foreign substances contained in it, by sulphuric acid of sp. gr. 1.83—1.84, since the latter affects neither the amorphous nor the crystallizable quinia, nor cinchonia. Finely-powdered crude quinoidine was mixed in small quantities with an equal weight of sulphuric acid, so that each portion was separately dissolved before the other was added, an operation not easily performed, since the powder conglomerates almost always, as soon as

it is thrown into the acid. After the lapse of twenty-four or thirty-six hours, the mixture is copiously diluted with water, and the deep greyish-brown substance which separates during this process, is filtered off. The latter, well washed, forms, if dry, a loose, amorphous, almost black, not bitter mass (four ounces of the best crude quinoidine, gave two drachms of it.) To the filtered liquid (which is clear, dark blue or brown, of an acid, and afterwards bitter taste,) whilst boiling, crystallized carbonate of soda is added, until a whitish precipitate forms—a dark brown resinous mass having already separated on the liquid having been saturated with the carbonate of soda. The white precipitate being formed, as much crystallized sulphate of soda is added, as of carbonate of soda used. The mixture is frequently stirred, boiled in the water-bath for about a quarter of an hour, and then allowed to cool. After some time, the thin film of pale yellow, transparent, resinous compound covering the surface having been removed, a somewhat hard, resinous, bitter, almost black substance, often covered with some cinchonia, is found at the bottom of the vessel. The compound which covered the liquid is quinoidine, in a purer state ; it is to be placed in the vessel intended to receive the filtered solution, whilst the filtrate is mixed with the required quantity of carbonate of soda for the effectual separation of the alkaloid. The almost white precipitate which had formed, dries up, in a few minutes, to a resinous mass, and is now repeatedly washed with hot distilled water. A considerable proportion of quinoidine remains, however, still in the precipitated resinous substance ; the same is, therefore, pulverized, and for some time digested with diluted acetic acid of about five per cent., till nothing more dissolves. The filtrate is mixed with sulphate of soda, by which a considerable quantity of an almost black resin separates, which adheres to the sides of the vessel. The filtered fluid which is of a wine-yellow

colour, yields upon the addition of carbonate of soda, the quinoidine, which is likewise to be washed with hot water, and dried in the water bath, together with that obtained before. The quinoidine thus obtained forms a yellowish white powder, which becomes electrical by friction, and dissolves perfectly in acid, spirit of wine, and also in ether, in which latter, a brown, resinous, bitter substance is precipitated. Four ounces of the best quinoidine furnished thirty drachms of purified quinoidine, whilst very inferior sorts only contained a very small quantity of the same. If quinoidine, as it is obtained in commerce, be dissolved in diluted sulphuric acid (1 part to 3—5 parts of water) purified quinoidine is also obtained by the foregoing method, but the separation of the brown, resinous combination takes place imperfectly, consequently the product is less pure. Still the diluted acid is well adapted for purifying inferior sorts of quinoidine from foreign admixtures, which cannot be dissolved by acids.

Experiments were now made to purify quinoidine, by ether. Eight ounces of a very excellent sort of quinoidine obtained from yellow cinchona (*cinchonia regia*) were mixed with twenty-four ounces of pure ether. The powder immediately conglomerated into a resinous mass, whilst the ether assumed a yellow colour, like gold. The ethereal solution having been poured off after a few days' digestion, was treated with animal charcoal and evaporated: four ounces of a pale-yellow, resinous, very bitter residue was obtained. This was converted by the necessary quantity of very diluted pure sulphuric acid into a neutral salt, and the solution evaporated by a gentle heat. Very soon a rather large quantity of pure sulphate of quinia crystallized out of it. This having been removed, no more crystals formed, even by further concentration. The solution was, therefore, again diluted, treated with purified animal charcoal, and the filtrate mixed with the necessary quantity of ammonia for precipitating the amorphous quinia contained

in it. The latter separated in the form of a beautiful white precipitate, which, however, soon conglomerated again. It was now washed with distilled water, dried in the water-bath and then pulverised; the powder weighed twenty-eight drachms, and consisted of very pure amorphous quinia. As that part of the amorphous quinia which had not been dissolved by the ether still tasted very bitter, twenty-four ounces of common ether were again added. This acquired a brownish-yellow colour, whilst the undissolved parts changed into a dark-brown liquid of the consistency of treacle. The ethereal solution deposited after some days a considerable quantity of a crystalline mass, and left, by evaporation, about ten drachms of a light yellowish-brown, amorphous, resinous, bitter substance, which, being treated with pure ether, separated into almost colourless amorphous quinia, a considerable quantity of coloured cinchonia, and a deep yellowish-brown, resinous, very bitter compound. When the latter was treated, according to the above-mentioned method, with an equal weight of sulphuric acid, a large quantity of pure amorphous quinia was obtained from it. That part which had remained undissolved, after having been treated with common ether, was dried in the water-bath, triturated, and mixed with diluted acetic acid. By this it was almost all dissolved. On the addition of Glauber salt, however, a rather large quantity of a dark-brown substance precipitated from the liquid, which, after being dried, possessed scarcely any bitter taste, and had a greyish-brown colour. The filtered acetic solution yielded upon the addition of liquid ammonia, a very deep-coloured quinoidine, which gave scarcely any trace of amorphous quinia to ether. The compound which had spontaneously crystallized out of the solution prepared with common ether, was dissolved in spirit of wine of eighty per cent., and the solution after being discoloured by animal charcoal, was filtered whilst boiling hot. On

cooling, a large quantity of cinchonia separated in crystals, and also on further evaporation. At last, a small quantity of alkaloid crystallized in the form of fine white prisms. Its nature was the same as the alkaloid before mentioned by the author under the name of *Quinidin*. The cinchonia thus obtained amounted to three drachms, the quinidin to forty grains. Out of the last proportions of the mother liquor there was also obtained by evaporation, a light-brown amorphous mass, from which a small quantity of amorphous quinia could be extracted by concentrated sulphuric acid.

Although it cannot be denied that good quinoidine contains very much alkaloid, there is still even in the best qualities, no part of the quinia free. It is always combined with a resinous substance. The amorphous quinia is further accompanied by a light-yellow compound, which adheres obstinately to it, and renders the purification very difficult. The brown compound appears to be some red cinchonic, changed by the action of the lime; the yellow compound, however, seems to be a peculiar constituent of the bark. Of ten sorts of saleable quinoidine examined by the author, only three contained a comparatively large proportion of amorphous quinia, five contained but little alkaloid, and two only traces of it; and it is in consequence of this varying composition of the crude quinoidine, that it cannot be recommended for medicinal use. It will, however, be advantageous to free crude quinoidine by diluted sulphuric acid (one part acid of 1.38 specific weight, and two parts water) and by pure ether from the foreign admixture, so that it might represent a preparation of equal chemical composition. If ether containing water and alcohol be employed, a quinoidine of a very different composition is obtained, and even if pure ether be used, it will depend on the chemical composition of the crude quinoidine whether the result will be a pure amorphous quinia, almost

pure white, yellowish, or yellow like gold. In the latter case, part of the colouring matter, might be removed by the formation of the neutral sulphate, and by treating it with purified animal charcoal. This, however, cannot be done without considerable loss. This colouring matter probably does not much influence the effect of the preparation. The yellow amorphous quinia becomes still brown on the addition of concentrated sulphuric acid, and after some time, if water be added, some brown flakes are precipitated. If yellow amorphous quinia be dissolved in muriatic acid, and an excess of chloride of platinum added, a pure, double quinia salt is formed; but if the filtrate be mixed with sal ammoniac and the solution evaporated in the water-bath to dryness, a yellow salt remains as residue, which contains, besides the platinum-chloride of ammonium, a golden-yellow, not bitter, substance, which is insoluble in ether, but is soluble in anhydrous alcohol, and may thus be isolated.—*Pharm. Journ. from Pharm. Central Blatt.*

ART. IX.—ON BLISTERING CLOTH.

By M. Garoste.

℞. Black pitch, purified, 125 parts,
White wax, 30 parts,
Cantharides in fine powder, 60 parts,
Essence of turpentine, 15 parts,
Olive oil, 8 parts.

The pitch is purified by melting it in a dish, and strain it through a close piece of linen.

The pitch, thus purified, is melted in an earthen vessel over a gentle fire, with the wax; the cantharides, the oil, and the essence of turpentine are then added; when the mixture is well stirred, a small quantity of the plaster is thrown into cold water and kneaded: if it be neither too soft nor too brittle, it is then spread on the glazed side of some oil-cloth with a plaster-iron slightly heated.

The quantity of wax, oil, and essence, may be varied according to the quality of black pitch employed, so as to give the plaster a consistence suitable for its being spread on cloth. Copper vessels should never be used for preparing those medicinal compounds of which wax is an ingredient; the plaster should be melted in a glazed earthen vessel. The cantharides are added by means of a sieve, so as to divide the particles, and prevent their collecting into lumps. It is convenient in sending out the blistering-cloth, to cut a piece of oiled paper of the same size, and lay this over the surface of the plaster, to prevent its adhering to the envelope.

These vesicatories should never be camphorated with a solution of camphorated ether, but rather with camphor finely pulverized, and for this purpose the blistering-cloth should previously be slightly warmed.

Of all the formulæ published for blistering-plaster, there are none, in my opinion, more easy in application, and that will keep in a better state of preservation than this.—*Pharm. Journ. from Journ. de Pharm.*

ART. X.—ON THE MANUFACTURE OF THE PROTOCHLORIDE OF TIN.

By Charles Nöllner.

When a long flask is filled to the top with granulated tin, and a concentrated solution of protochloride of tin is then poured into it, and kept constantly boiling, large bubbles of muriatic gas incessantly escape from the solution, which gradually dissolve the tin above the liquid; and in proportion as this happens, an amorphous crust of tin separates from the tin-solution on the surface of the liquid; so that if the boiling were continued for fourteen days, as much of the tin situated above the liquid would be dissolved as the solution previously contained. No hydrogen gas is evolved; it is merely a continuous separation and reunion of the elements of the tin-salt, the electronegative constituents of the solution, *i. e.*, the muriatic acid and the oxygen of the water combine with the tin situated above the liquid, which is there positive, and dissolve it; while the protoxide of tin and the hydrogen of the decomposed water, the positive constituents of the solution, proceed beneath the surface of the liquid to the tin, which is there negative, the hydrogen reducing the protoxide of tin, and thus eliminating tin in the form of a bright metallic layer.

If this process is carried out in the cold by placing a bar of tin in a concentrated solution of the protochloride, and carefully pouring a layer of water upon this, so that the bar of tin is situated in both liquids, we very soon observe at the place where the two liquids are in contact, the tin separate in spicula, frequently from four to five inches long. Sometimes it is also obtained in very thin quadratic laminæ, which readily separate at their centre into four rectangular

triangles, and which upon closer examination under the microscope are formed exactly like those scalariform pyramids, composed of innumerable cubes, of chloride of potassium, chloride of sodium, &c.; the spicula above-mentioned are likewise scalariform pyramids, elongated in one direction, and upon which numerous minute, very regularly formed cubes usually occur. When the separation takes place more slowly from less concentrated liquids, and especially when large quantities are operated upon, very regular four-sided columns are obtained. When, on the contrary, a solution of tin is made to support a stratum of dilute muriatic acid, or a mixture of muriatic acid and solution of tin, a stratum of water or concentrated muriatic acid and water, and a bar of tin is carefully inserted, crystals are immediately formed, but which, on account of the rapidity of their formation, resemble more closely the flowers of chloride of ammonium; just as sal-ammoniac separates on slow crystallization in cubes, but when quickly evaporated produces the well-known arborescent figures.

Above and beneath the spot where the crystals of tin separate, a thin black layer is formed, consisting of finely-divided copper with some tin when commercial tin is used, which always contains copper and some iron; when several such bars are connected, after the manner of Zamboni's battery, in adjacent glasses containing strata of tin solution and water, crystals are formed in each of the glasses; but the black deposit appears at first always in one direction, being on one side of the bar of tin above, and upon the other side below the limit where the two liquids touch; but after a time this sediment is formed both in the water and in the tin solution of each glass.

Copper resembles tin in its behaviour, but it requires from eight to fourteen days to obtain regular octahedrons.

When this electrical process is applied to the preparation of the protochloride of tin on a large scale, the ordinary

plan is entirely reversed. The tin is not dissolved in dilute muriatic acid, and the saturation effected by repeatedly pouring the ley over granulated tin; but earthenware recipients, filled with granulated tin, are adapted to the retorts from which the muriatic acid is disengaged, by which a highly concentrated solution is obtained, with the advantage, moreover, that the muriatic acid is instantly absorbed by the tin; thus avoiding all loss of muriatic acid and its destructive effects upon the building and vegetation. Nor are the workmen at all inconvenienced by the vapours. The concentrated solution of tin is now evaporated, not in earthenware or copper vessels, but in a tin pan, which is easily constructed; and the evaporation must always be conducted as in a copper pan with a large excess of granulated tin; for even though the solution contain free muriatic acid, the granulated tin and not the pan is acted upon, the tin of the pan becoming electro-negative, while the granulated tin in the pan becomes electro-positive. All the copper contained in the liquid is deposited upon the granulated tin as a black powder, while pure tin, in bright metallic layers, is deposited upon the tin pan itself at the surface of the evaporating solution; so that if such a tin pan, after daily use for several years, should be worn into a hole, it may easily be mended by stopping it first with a tin nail, and keeping the surface of the evaporating tin solution for a length of time at that spot, when it is gradually stopped, being as it were soldered in the *moist way.—Chem. Gaz. from Liebig's Annalen.*

ART. XI.—METHOD OF DETECTING THE ADULTERATION OF CANE-SUGAR WITH STARCH-SUGAR, AND THE SYRUP OF THE FORMER WITH THAT OF THE LATTER.

By Dr. G. Reich.

When a boiling saturated solution of bichromate of potash is added to a thick syrup of cane-sugar and the mixture heated to boiling, the chromic acid is reduced with a violent reaction, which continues even after removing the vessel from the fire, and the liquid is coloured green by the oxide of chromium in solution. When starch-sugar syrup is treated in the same manner, a very different behaviour is observed, and which may be employed to distinguish these two kinds of sugar; the starch-molasses has not the least action on the bichromate of potash; and when mixed with cane-sugar molasses to the amount of $\frac{1}{3}$–$\frac{1}{8}$, prevents the reaction of the latter; the mixture merely froths somewhat more when heated, but does not change its colour. When the amount of starch-sugar molasses is smaller, a slight alteration of colour is perceptible; but it is never so decided as with cane-sugar syrup alone. While these syrups may be thus distinguished, the sugars themselves cannot be determined in this manner, because the bichromate of potash is wholly without action upon the concentrated solutions of both, but they may be distinguished by nitrate of cobalt. When some potash is added to a concentrated solution of pure cane-sugar, and the mixture heated to boiling, a violet-blue precipitate falls, even when the solution is diluted, on the addition of a few drops of nitrate of cobalt. The dilute solution of the starch-sugar, treated in the same manner, is not precipitated; and the concentrated

solution of the same sugar, to which potash has been added, deposits a dirty brown precipitate. A small amount of starch-sugar in the cane-sugar prevents the formation of the violet-blue precipitate with nitrate of cobalt. The above experiments of Reich have been repeated and confirmed by Herzog, who observes that the syrup of beet-root sugar acts as violently on the bichromate of potash as the syrup of cane-sugar; the liquid, however, does not become green, but retains its colour like the syrup of starch-sugar. A mixture of cane-sugar syrup and the syrup of beet-root sugar must however contain far more of the latter for the green colouring produced by the cane-sugar not to appear. Herzog likewise examined the method proposed by Reich to distinguish grape-sugar and cane-sugar with nitrate of cobalt, and likewise recommends it. Beet-root sugar and mannite afford, according to Herzog, when mixed with potash, the same precipitate with solution of cobalt as cane-sugar. Milk-sugar prevents the precipitation of the nitrate of cobalt by potash, like grape-sugar. Herzog at the same time asserts that mannite, when boiled with sulphate of copper and potash, immediately reduces the oxide of copper, which is not the case according to Dr. Knop when the mannite is pure and perfectly free from grape-sugar.—*Chem. Gaz. from Archiv. der Pharm.*

ART. XII.—RESEARCHES ON GENTIANINE.

By Dr. Baumert.

Gentianine was first considered to be the bitter and medicinal principle of the gentian root; and subsequently, after it had been prepared by Tromsdorff pure and free from the bitter principle of the root, it was looked upon as a colouring substance, and called by Lecomte *genticine*. The following investigation makes us acquainted with the composition and chemical nature of this body. To prepare it, the gentian root was first freed from a portion of the bitter extract by exhaustion with cold water, then dried again and extracted with alcohol. On removing this by distillation, a brown resinous mass, of an excessively bitter taste and acid reaction, remains. On pouring water over it, light brown flakes separate, while the bitter principle, the acid, sugar, &c., dissolve in the water. The precipitate thrown down by water from the syrupy residue is purified as much as possible from the bitter substance by washing; it then contains gentianine, a caoutchouc-like substance, fat, and still some of the bitter principle. The fat is removed by treatment with æther, and the residue again dissolved in strong alcohol, which upon evaporation leaves a crystalline mass still possessing a bitter taste and containing an admixture of resin. The gentianine is at last obtained pure by frequent recrystallization in light yellow acicular crystals; but this mode of preparation is connected with considerable loss, as the gentianine is somewhat soluble in water, and still more so in æther. Only 1 drm. of gentianine was obtained from 20 lbs. of the root; but even this amount was greater than that obtained according to the process advised by Lecomte, which is based upon the fact that the

gentianine is not precipitated by the neutral acetate, but only by the basic acetate of lead, so that a great portion of the impurities can be removed by a solution of the first salt.

Gentianine crystallizes in slender, pale yellow, tasteless needles. It is very sparingly soluble in water; 1 part requires 3630 parts water; it dissolves best in boiling alcohol; it dissolves in alkaline water, imparting to it an intense yellow colour; it is permanent in the air, and may be heated to 392° without loss of water; it sublimes between 572° and 644°, disengaging yellow vapours, which condense into fine needles, while the greater portion is carbonized with evolution of a peculiar odour. Gentianine has the following composition:

Carbon,	65.05	65.09	65.04	14	=1050.0	65.11
Hydrogen,	4.15	4.24	4.10	5	62.5	3.87
Oxygen,	30.80	30.67	30.86	5	500.0	31.02
					1612.5	

Gentianine has no reaction upon the vegetable colours; it is a neutral or indifferent body, which combines with acids and bases without parting with the elements of water. It expels carbonic acid from the carbonated alkalies, but the carbonic acid of the atmosphere likewise decomposes several of its combinations if they are still moist.—*Chem. Gaz.*

ART. XIII.—ON THE ACETOUS FERMENTATION OF SOME OF THE ALCOHOLIC PREPARATIONS OF THE PHARMACOPŒIA.

By Mr. William Bastick.

In all the works on Materia Medica and Pharmacy which I have examined, where the subject is alluded to at all, it is stated that the tinctures of the Pharmacopœia are very stable preparations, and that the only deterioration which takes place in them is that caused by the evaporation of the spirit, producing, in consequence, either a more concentrated tincture, or precipitating a portion of the materials held in solution. That the above statement falls far short of the real facts is well known by all Pharmaceutists, from the circumstance that most of the tinctures made with proof spirit undergo a gradual change, which ultimately ends in rendering them comparatively inert and worthless.

With a view to ascertain what was the general nature of the change to which these alcoholic preparations were liable, portions of various ones were kept many months in the ordinary circumstances in which they would be placed by their consumption in a Druggists' shop, such as being in bottles half-filled in a temperature varying from 60 to 80 degrees of Fahrenheit, and occasionally admitting fresh air.

After a lapse of time, most of them, on examination by the proper tests, were found to have undergone the acetous fermentation in a greater or lesser degree—the alcohol having been gradually converted into acetic acid. The tinctures were generally diminished in colour and taste, and contained a precipitate, a portion of which was re-

soluble on the addition of a sufficient quantity of spirit to supply the place of that decomposed. This circumstance shows that a part of the precipitate was caused by the decomposition of the alcohol, and a part by the destruction of the vegetable principles themselves. When the tinctures in this condition were completely exposed to the action of the atmosphere at a sufficient temperature, the alcohol contained in them was speedily and entirely converted into acetic acid.

The proof-spirit tinctures most liable to the acetous fermentation are those which contain those proximate principles in solution which are prone, *per se*, to decay, the spirituous menstruum not having sufficient antiseptic power to permanently resist their decomposition. The tinctures made with rectified spirit are not susceptible of any change of a similar character, neither are the tinctures above spoken of, when the strength of the spirit is considerably increased, arising from the insolubility of some of the proximate principles prone to decay in the stronger spirit, as well as its antiseptic quality.

That the acetous fermentation is induced in the tinctures by the presence of bodies in a state of change, acting as a ferment, is clear from the fact that a mixture of alcohol and water will not ferment without the presence of some such body. It is also evident that the vegetable substances held originally in solution have been subject to a material change by the loss of colour and taste of the tincture, and by it containing a precipitate, a portion of which was insoluble in a mixture of alcohol and water.

Some of the preparations most prone to this change are the tinctures of senna, rhubarb, columba, henbane, digitalis, bark, hops, aloes, compound tincture of cinnamon, compound decoction of aloes, concentrated infusions, fluid extracts, and all similar preparations, especially those which are weaker in spirit than the tinctures. Many complaints

have been made by Pharmaceutists, of the proneness to decomposition of the compound decoction of aloes, and they have suggested remedies for its prevention; but none have pointed out the general nature of the process of decay. which differs somewhat from the tinctures from carbonate of potash being used in its fabrication.

If the decoction is examined when first prepared, after having been sufficiently boiled, it will be found that the carbonate of potash has been decomposed by the resinous acids of the myrrh and aloes. On the addition of acetic acid no carbonic acid will be evolved, but the resinous matter which is in combination with the potash, forming compounds analogous to the soaps, will be precipitated, and may be re-dissolved by more of the alkali or alcohol. When the acetous fermentation has sufficiently advanced in the decoction, the alkali will be found in combination with acetic acid, which acid has precipitated the resinous acids from the base. Crystals of acetate of potash may be obtained by evaporating the clear portion of the decoction. The resinous matter may be separated from the precipitate by the action of a solution of carbonate of potash.

From the above statement may be gathered answers to the questions which have been so often asked, as to whether compound decoction of aloes ought to be clear or opaque, and in what condition it is proper to use it. Compound decoction of aloes, fluid extracts, and all other analogous aqueous solutions of vegetable substances, when the spirit is added which is used to preserve them, will precipitate a portion of the proximate principles held in solution, because they are less soluble, or quite insoluble in such a mixture of water and alcohol. This precipitation does not frequently occur at once, from the circumstance that the spirit is added to the solution before it is cooled down to that temperature at which the principles become insoluble in the mixture. It is therefore prudent not to add the spirit

until the preparation has acquired that temperature to which it is exposed in the course of consumption. Should a precipitation occur after these precautions have been adopted, it may be taken as a tolerably clear evidence that the preparation is decomposing; consequently it is manifest that when the decoction is in this condition, neither the clear portion, nor the clear and thick together, should be used for the purposes of that ordered by the Pharmacopœia, as the whole must necessarily be changed in its properties. As we are expressly forbidden to alter the constitution of any of the preparations of the Pharmacopœia, any suggestions to remedy the evils complained of by such means are futile. There is but one course open to us, viz., to inquire under what conditions can these preparations be kept most powerful to resist their tendency to decomposition? The answer will be, that as far as circumstances will permit to keep the preparations in bottles, filled and well closed, and in a low temperature, which are the conditions found to be least favourable to the development of the acetous fermentation.—*Pharm. Journ.*

ART. XIV.—CHLOROFORM AN ANÆSTHETIC AGENT AS A SUBSTITUTE FOR SULPHURIC ETHER.

Dr. Simpson gives the following account of the chemical constitution of Chloroform:

"Formyle is the hypothetical radical of formic acid. In the red ant *(Formica rufa)* formic acid was first discovered, and hence its name. Gehlen pointed it out as a peculiar acid; and it was afterwards first artificially pre-

pared by Doebereiner. Chemists have now devised a variety of processes, by which formic acid may be obtained from starch, sugar, and, indeed, most other vegetable substances.

A series of chlorides of formyle are produced when chlorine and the hypochlorites are brought to act on the chloride, oxide, and hydrated oxide of methyle (pyroxylic or wood spirit.) In the same way as formic acid may be artificially procured from substances which do not contain formyle ready formed,—so also are the chlorides of this radical capable of being procured from substances which do not originally contain it.

Chloroform, chloroformyle, or the perchloride of formyle, may be made and obtained artificially by various processes,—as by making milk of lime, or an aqueous solution of caustic alkali act upon chloral,—by distilling alcohol, pyroxylic spirit, or acetone, with chloride of lime,—by leading a stream of chlorine gas into a solution of caustic potass in spirit of wine, &c. The preparation which I have employed was made according to the following formula of Dumas:—

'℞ Chloride of lime in powder, - *lbs.* iv.
Water, - - - - - - *lbs.* xii.
Rectified spirit, - - - f.℥xii.

Mix in a capacious retort or still, and distil as long as a dense liquid, which sinks in the water with which it comes over, is produced.' (Gray's *Supplement to the Pharmacopœia*, 1846, p. 633.)

The resulting perchloride of formyle consists of two atoms of carbon, one of hydrogen, and three of chlorine. Its specific gravity is much greater than that of water, being as high as 1.480. It boils at 141°. The density of its vapour is 4.2. It is not inflammable, nor changed by distillation with potassium, potash, sulphuric, or other acids.

It is now well ascertained that three compound chemical bodies possess, when inhaled into the lungs, the power of superinducing a state of anæsthesia, or insensibility to pain in surgical operations, &c., namely, nitrous oxide, sulphuric ether, and perchloride of formyle. The following tabular view shows that these agents are entirely different from each other in their chemical constitution, and hence that their elementary composition affords no apparent clue to the explanation of their anæsthetic properties :—

	Propor. of Nitrogen.	Propor. of Oxygen.	Propor. of Carbon.	Propor. of Hydrogen.	Propor. of Chlorine.
Nitrous Oxide,	1 Atom.	1 Atom.	...	...	...
Sulphuric Ether,	...	1 Atom.	4 Atoms.	5 Atoms.	...
Chloroform,	...	...	2 Atoms.	1 Atom.	3 Atoms.

It is, perhaps, not unworthy of remark, that when Soubeiran, Liebig, and Dumas engaged, a few years back, in those inquiries and experiments by which the formation and composition of chloroform was first discovered, their sole and only object was the investigation of a point in philosophical chemistry. They laboured for the pure love and extension of knowledge. They had no idea that the substance to which they called the attention of their chemical brethren could or would be turned to any *practical* purpose, or that it possessed any physiological or therapeutic effects upon the animal economy. I mention this to show, that the *cui bono* argument against philosophical investigations, on the ground that there may be at first no apparent practical benefit to be derived from them, has been amply refuted in this, as it has been in many other instances. For I feel assured, that the use of chloroform will soon entirely supersede the use of ether; and, from the facility and rapidity of its exhibition, it will be employed as an anæsthetic agent in many cases, and under many circumstances, in

which ether would never have been had recourse to. Here then we have a substance which, in the first instance, was merely interesting as a matter of scientific curiosity and research, becoming rapidly an object of intense importance, as an agent by which human suffering and agony may be annulled and abolished, under some of the most trying circumstances in which human nature is ever placed."

[In confirmation of the remark that the elementary constitution of the three known anæsthetic agents affords no explanation of the theory of their action, we may mention another circumstance, namely, that while it is currently stated, and we believe on good grounds, that the presence of a very small proportion of alcohol in sulphuric ether occasions so much irritation as to render it improper for inhalation, the chloric ether which consists of chloroform, with above 80 per cent. of alcohol, produces little or no irritation, and was originally preferred to sulphuric ether partly on this account.

As it is likely that chloroform will be extensively used, it is particularly desirable that uniformity in its constitution should be observed. Time and exparience will probably bring it to a moderate cost, and insure to the public the advantage of a uniform preparation. We have received a communication from Mr. Morson, and another from Mr. Hooper, each of which contains a caution on this subject, pointing out the importance of distinguishing between chloroform and chloric ether. The great specific gravity of chloroform, and its insolubility in water, are mentioned as characteristic tests, to which we may add, that it is a body very difficult of ignition, which will readily distinguish it from chloric ether.—*Ed. Pharm. Journ.*]

In a paper on the chlorides of hydro carbon, published in 1833, in the 4th vol. of this Journal, its author, Daniel B. Smith, uses the following significant language: "The action of this ether [chloroform] on the living system is interesting, and may hereafter render it an ob-

ject of importance in commerce. Its flavour is delicious, and its intoxicating qualities equal to or surpassing those of alcohol. It is a strong, diffusible stimulant, similar to the hydrated ether, but more grateful to the taste."

Several of our manufacturers now furnish chloroform of good quality, and we shall, ere long, have its powers fairly tested, as a strong interest is felt in reference to it by the medical public. W. P., Jr.

ART. XV.—ON PERCHROMIC ACID.

By M. Barreswill.

On mixing a concentrated solution of chromic acid with an equally concentrated solution of peroxide of hydrogen, a violent effervescence is immediately produced by an escape of pure oxygen; when, on the contrary, the solutions are mixed in a very diluted state, the liquid assumes an intense blue colour. This blue colour is of extremely slight stability, and appears to point to the formation of a very readily decomposable higher oxide of chromium than chromic acid; and which, when concentrated solutions are employed, is decomposed immediately on its production. The blue compound may be obtained by mixing a dilute solution of peroxide of barium with an excess of muriatic acid in a dilute solution of bichromate of potash, but it is so unstable that it cannot be isolated from this liquid. It is, however, according to the following experiments, perchromic acid, $Cr^2 O^7$. To determine the constituents of this body, the author made use of Gay-Lussac and Thenard's apparatus for the analysis of organic substances with chlorate of potash, substituting for the tube a balloon capable of holding half a pint of water.

The balloon was half-filled with impure very acid peroxide of hydrogen, and placed in cold water. A tube connected with the balloon passed with its curved end under a graduated cylinder entirely filled with water. The apparatus so arranged was left for twenty-four hours, during which time not a bubble of gas passed into the cylinder. Upon this an accurately weighed quantity of bichromate of potash, in pieces of a nearly equal size, was conveyed through the cock into the liquid. As these pieces fell into the liquid they were surrounded with blue streaks, and bubbles of gas were disengaged, which passed into the cylinder. When the whole of the bichromate of potash had been added to the liquid, the amount of gas disengaged was read off after two hours' standing, and a second reading made after twenty-four hours; during this interval there was no perceptible increase of gas, although the liquid still contained peroxide of hydrogen. The chromium is no longer contained in the liquid as chromic acid when the evolution of oxygen has ceased, for the acid itself loses a portion of its oxygen during the effervescence, and is left as oxide. 0.5 grm. bichromate of potash disengaged.—I. 152, II. 157, III. 150, IV. 151, V. 150 cubic centimetres of oxygen, that is 1 equiv. of the salt to 4 equivs. of the latter, theory requiring 151 (equiv. of chromium = 310) or 155 (equiv. of chromium = 328.) Now, since the chromium in 1 equiv. of the bichromate of potash, after it has been converted into the blue compound, and this again decomposed, is left behind as oxide, and consequently 1 equiv. of the salt parts with 3 equivs. of its oxygen, we may thence conclude that the peroxide of hydrogen, for every equivalent of the salt, adds 1 equiv. of oxygen to 6 in the chromic acid of the salt, so that the blue body obtains the composition $Cr^2 O^7$. The reaction which gives rise to the perchromic acid may be expressed in the following manner:

$$2(KO,CrO^3)+HCl+O=KCl+HO+Cr^2 O^7.$$

The decomposition of the perchromic acid in the muriatic liquid is

$$Cr^2 O^7 + 3HCl = Cr^2 Cl^3, 3HO + O^4.$$

It was attempted to confirm this reaction by the isolation of the perchromic acid; but all experiments to combine the blue body with an inorganic base failed, and after the experiment was concluded a chromate was constantly found in the liquid. Ether, on the contrary, by being agitated with the aqueous liquid, immediately took up the blue body, the water became colourless, and the supernatant æther blue. But as soon as the æther was removed and evaporated, the water dissolved in it was found to contain chromic acid, as in the preceding experiments, and not oxide of chromium. The author succeeded in combining perchromic acid with vegetable bases. Quinine and strychnine dissolved in æther were precipitated of a dirty violet by the perchromic acid, extracted with æther from the aqueous solution; but the stability of these salts was very slight, and they could only be kept a few hours after their preparation.

Some experiments to procure higher oxides of other metallic acids led, in the case of vanadic acid, to the following result: On treating the vanadiate of ammonia in the same manner as the chromate of potash in the preceding experiments, the liquid assumed a blood-red colour, which was more constant; but from the small quantity of material at the author's disposal, the compound could not be further examined.—*Chem. Gaz., from Ann. de Chim. et de Phys.*

ART. XVI.—ON THE PROCESS OF M. ARMAND ROUSSEAU, FOR PRODUCING UPON PORCELAIN A FINE DEAD SILVER, NOT AFFECTED BY SULPHUROUS EXHALATIONS.

By M. Alexander Brongniart.

M. Armand Rousseau, decorator of porcelain, presented to the Society for the Encouragement of Arts, Paris, specimens of porcelain, the principal decoration of which consists of wavy lines, having the appearance of dead silver. This dead silver, which is of a fine white colour, being relieved by ornaments of blue or any other lively colour, produces a very good effect, and presents the appearance at first sight of white mother-of-pearl, or that which reflects no prismatic colours.

This application of silver on porcelain was well known before M. Rousseau's process; but the results were in general imperfect, being less pure, and possessing less metal than the specimens submitted to the Society. The dead silver prepared and applied by M. Rousseau admits of a very fine burnish being applied, the ground presenting the appearance of white pearl, which sets off to great advantage the ornaments painted thereon. The new process possesses, however, another advantage, of much greater importance than the above-mentioned improvements. It is well known, that by the action of air, charged with the most minute portion of sulphurous particles, silver loses, first its lustre, then its metallic appearance, and finally assumes a leaden appearance, approaching to black; this serious defect has caused the use of metallic silver to be rejected by all manufacturers who wish their porcelain to be ornamented in a durable and brilliant manner. The lustre may be renewed by cleansing; but the fine dead appearance of the silver, and also the burnishing, are quite destroyed;

the brilliancy of the surrounding colours is deteriorated, and the friction, however carefully the cleansing may be effected, carries off a portion of the metal, which is necessarily laid on very thin.

By M. Rousseau's very simple process, the silver is completely protected from the injurious action of the sulphur, in whatever quantity and in whatever state it may be. This statement is proved by various facts. The Ceramic Museum at Sèvres has possessed, since the year 1845, specimens which were placed there by M. Rousseau at that time, and at the end of eighteen months they did not appear to have undergone any change. As it was not evident, however, that they had been exposed to any sulphurous exhalations, while there, I requested M. Rousseau to furnish me with an article for the purpose of submitting it to the action of sulphuretted hydrogen gas; and he gave me the half of the tube of an opera-glass, which had been in use: this was exposed during several weeks in the chemical laboratory, and the only alteration it underwent was that it was turned slightly yellow; but this was easily removed by a little soap and water. Shortly afterwards the same piece was, together with the pretty little box now presented to the Society, fully exposed to the exhalations from a cesspool, which was being emptied; and they were both, when taken out, in their present state of freshness. From this it became evident that M. Rousseau was in possession of the secret of giving to dead silver (which is much more easily affected by vapours than burnished silver) the power of resisting the deleterious action of the strongest hydrosulphuric exhalations.

This important object is effected by the employment of gold. A very thin layer of this metal is laid, by means of a brush, over the silver with which the porcelain is ornamented, before firing it, when, by the help of a flux and a cherry-red heat, the two metals are fixed on the porcelain.

This is the principle and mode of putting it in practice; but its success depends upon the skill and experience of the operator. For instance, the silver must be dissolved in very dilute acid, and slowly precipitated, and the metallic precipitate must be well washed. The silver is then laid upon the porcelain before being coloured (or, if coloured, the colour must not be any preparation of gold,) in a pasty state, and left for twenty-four hours, at the expiration of which time the gold is to be laid on, and the article fired at a moderate heat.—*Ibid., from Bulletin de la Société d'Encouragement.*

ART. XVII.—ON THE CONSTITUENTS OF LACTUCARIUM.

By M. Ludwig.

The lactucone recently described by Lenoir is, according to Walz, nothing more than the lactuca fat examined by the latter. Thieme has likewise examined the body which is removed by ether from the alcoholic extract; but he could not succeed in separating it, as stated by Walz, into a fat easily soluble in ether, and one of sparing solubility in that medium, on which account he named it *lactucerine*. Ruickoldt obtained lactucerine by frequent extraction of the lactucarium with absolute alcohol, evaporation, washing the crystals so obtained with water, re-solution in absolute alcohol, again rinsing the crystals with water, and desiccation under the air-pump. The lactucarium employed by the author for the preparation of lactucerine had been collected in the neighbourhood of Ilten near Hanover. It was

exhausted with water, and the insoluble residue treated several times with hot alcohol of 0.833. On the slow evaporation of the latter, a somewhat yellowish lactucerine was obtained, which was purified by washing with water, re-solution in alcohol and crystallization. The quantity of lactucerine amounted to 53.5 per cent.

Lactucerine forms snow-white aggregated granules, and dissolves in strong hot alcohol, from which it again separates on cooling; the alcoholic solution faintly reddens litmus paper. It dissolves readily in ether, but not in water, when pure. When warmed in a platinum dish, it becomes tenacious and transparent, like turpentine; when heated more strongly, it melts completely to a clear yellow oil, gives off white vapours possessing an agreeable odour, and is volatilized with the exception of a slight residue of a perfectly combustible cinder. Heated in a closed glass tube in a bath of chloride of zinc, it still continues pulverulent at 131° F., becomes decomposed at 158°, and disengages aromatic acid vapours at 200°. At 212° it experiences scarcely any loss; at 298° it becomes tenacious and like turpentine, without melting; at 320° it forms a thick liquid; between 356° and 374° it becomes thinner, and loses 2.110 per cent. The residue, again dissolved in spirit, separates, but still of a yellow colour. Melted at 374° in hydrogen gas, it gives off aromatic vapours, and loses 4.04 per cent. in weight. Submitted to destructive distillation, it melts, becomes yellow, and gives off white vapours, which condense to a colourless liquid; subsequently a yellow oily liquid distils over, and lastly a dark oil; the residue consists of a thin coating of a shining black coal. The gases which escaped produced no turbidness in lime-water, nor could they be set light to. The distillate consisted of a colourless aqueous acid layer and a heavier yellowish-brown oil. The odour was pungent, acid and aromatic. The acid aqueous liquid

gave no precipitates with oxide of mercury or silver; oxide of mercury dissolved in it without being reduced. The acid is evidently acetic acid. The oil did not dissolve entirely in alcohol, but readily in ether. Lactucerine cannot be saponified by caustic potash, but melts on evaporation to a brown mass, and is decomposed. The hydrate of sulphuric acid dissolves lactucarium immediately with a brown colour; nitric acid likewise dissolves it, and yields on evaporation a yellow residue soluble in ammonia. It gave on analysis—

Carbon,	76.202	77.286	77.090	40 =	76.650
Hydrogen,	10.654	10.832	10.902	34	10.719
Oxygen,	13.144	11.882	12.008	5	12.631

Two other experiments yielded results corresponding to the formula C^{40} H^{33} O^{4}, while Lenoir found for lactucone $C_{0}H^{33}O^{3}$. It appears therefore that lactceurine prepared from fresh lactucarium may be converted into lactucone by the elimination of 1–2 equivs. water. Lactucone and lactucerine are distinguished from caoutchouc, a name which has sometimes been applied to them by containing oxygen. On examining a lactucerine which consisted of microscopic crystals, the author obtained exactly the same composition for it as for the amorphous; both agreed with Lenoir's formula, having been prepared from old lactucarium.

In order to determine the other constituents of lactucarium the author let the milk sap ooze out of the plant into distilled water. In a few moments it separated into a bright yellow clear solution and into white floating flakes; the portion insoluble in alcohol was digested several times with ether, and this then removed by distillation. It left a waxy body, which melted at a gentle heat, and produced a permanent stain of fat upon paper. The aqueous solution of lactucarium when fresh is perfectly neutral, but becomes sour on boiling. The liquid separated from the coagulated

albumen was exhausted with alcohol, and the alcoholic extract with ether:

Lactucerine or lactucone,	42.64	48.63 per. cent. insoluble in water.
Waxy body, readily fusible	3.99	
Vegetable fibre, with a substance which swells in ammonia and is insoluble in water, alcohol and ether,	2.00	
Albumen of a greyish colour,	6.98	
Extract soluble in water and in spirit,	27.68	51.37 per cent. soluble in water.
Aqueous extract, insoluble in alcohol of 0.830,	14.96	
Lactucerine, held in solution in water by the other substances,	1.75	

From the bitter extract soluble in water and spirit the author obtained lactucic acid in the following manner: 80 grms. of lactucarium were rubbed to afi ne powder, and then triturated in the cold with 80 grms. of pure dilute sulphuric acid, and subsequently mixed with 400 grms. of alcohol of 0.851, filtered, and the filtrate shaken with hydrate of lime until a filtered sample no longer afforded a precipitate with barytic water nor with oxalate of potash. The filtered alcoholic solution was then decolorized with pure animal charcoal and evaporated. A brown tenacious mass like turpentine separated, which dissolved in boiling water, leaving behind a tenacious viscous substance. On decolorizing the aqueous solution with animal charcoal and evaporating, a mixture of lactucic acid with Aubergier's lactucine remained; the latter separated from its solution in boiling water on cooling in white crystalline scales, and the lactucic acid was obtained on evaporation. This latter is readily soluble in water and alcohol, difficult to obtain crystallized, of a light yellow colour, and strongly bitter taste; it has no acid reaction. Solution of caustic soda, lime water, barytic water and caustic ammonia colour the acid immediately, or after some time, wine-red. A solution of sulphate of copper is not precipitated; but on the addition

of caustic soda and boiling, the oxide is reduced to protoxide, and the liquid acquires a dark brown colour; on adding now a little muriatic acid, brown humus-like flakes subside. There was no sugar contained in the acid, a point which was ascertained with certainty. A solution of acetate of lead gives a white precipitate; nitrate of silver is not precipitated, but on the addition of caustic ammonia and boiling, it is reduced to metal. The peracetate of iron yields with it after some time a white precipitate; concentrated sulphuric acid is coloured yellow in the cold; on the application of heat it becomes reddish brown and black, with evolution of sulphurous acid. Concentrated nitric acid is coloured faintly yellow by it. Heated in a platinum dish, the acid melts, becomes brown, gives off acid vapours, and leaves a voluminous cinder, which is entirely consumed.

Lactucine which has been decolorized with animal charcoal and purified by recrystallization, forms white pearly scales, the solution of which exhibits no reactions with basic acetate of lead, peracetate of iron and iodine water. Concentrated sulphuric acid affords a colourless solution with it in the cold; when heated, the liquid becomes yellow, brown, and finally black. Hydrated oxide of copper is reduced to protoxide by it and the addition of potash. Lactucine melts when heated, without being coloured; at a higher temperature it becomes brown, and leaves a porous cinder, which is easily burnt.

The aqueous solution of the alcoholic extract of lactucarium, after separation of the brown mass containing the lactucic acid, left on slow evaporation a yellowish-white somewhat crystalline mass, which, extracted with hot alcohol of 0.851, left on evaporation a neutral, insipid, sweetish body, crystallizable from water, but incapable of fermentation. The spirituous solution yielded on evaporation long silky prisms, which had all the characters of mannite.

The precipitate above obtained by agitation with hydrate

of lime was supersaturated with dilute sulphuric acid; the expressed liquid was purified with animal charcoal and evaporated to a syrupy consistence. On cooling, it congealed to an amorphous gelatinous mass, of an astringent, slightly acid taste. It was extracted with water, precipitated with acetate of lead, and the precipitate decomposed with sulphuretted hydrogen. On evaporating the liquid, white prisms, which behaved precisely like oxalic acid, crystallized from it. The mother-ley contained, along with sulphuric acid, a third organic acid, which has not been further examined, but which strongly reduced solution of silver. Lactucarium, extracted with spirit containing sulphuric acid, gives up to hot alcohol much lactucerine and a soft resin, together with oxalic and lactucic acid; no sugar or gum could be detected in it. Water removed from the residue sulphate of potash, sulphate of magnesia, and basic persulphate of iron; ether took up a tenacious waxy body, which was not further examined. 3 grms. of dry lactucarium, heated in a retort for six hours in a water-bath, yielded 0.18 grm. of an aqueous colourless acid distillate, which smelt of lactucarium; on digestion with oxide of zinc it lost its acid reaction, and on evaporation its odour. 1.40 grm. of lactucarium, distilled with 3 grms. of sulphuric acid and 12 grms. water, yielded an acid distillate, which smelt strongly of lactucarium, and which, on saturation with carbonate of lime and distillation with bisulphate of potash, afforded an acid liquid, which had a valerian-like odour, and contained no acetic acid.—*Chem. Gaz., from Archiv. der Pharm.*

ART. XVIII.—PATENT INKS, AND NEW SALTS OF GOLD.

Patentee, Rev. J. B. Reade, of Stone Vicarage, Aylesbury.

Blue Writing Ink.

1st. I manufacture, in manner following, a blue writing ink, which is wholly free from acid, and therefore well adapted for use with steel pens. I first obtain a solution of iodide of iron by the process ordinarily followed for that purpose, and then dissolve therein half the weight of iodine already employed. I next pour this mixture into a semi-saturated solution of yellow prussiate of potash, employing a weight of this salt nearly equal to the whole weight of iodine used in the above iodine solution. A decomposition of the materials thus brought together immediately takes place, when the cyanogen (of the prussiate of potash) and iron combine, and are precipitated in a solid form, and the potassium (of the prussiate) and iodine combine to form a neutral iodide of potassium, which remains in solution with a little excess of iodide of iron. I next filter and wash the solid precipitate of cyanogen and iron (which is soluble Prussian blue,) and finally dissolve it in water, which forms the blue ink required. In this process, it will be observed that neither any acid nor persalt of iron is employed, as is usual in the formation of Prussian blue.

I was led to these results by a microscopical examination of the metallic colours in salts of the ashes of plants. I employed iron and iodine to produce the same effects on pure salts; and in the course of my experiments I ascertained that these two substances (iron and iodine) have so great an affinity for each other, that when placed together without any water, or when rubbed together, they very speedily form a liquid, containing an excess of iodine in solution, which,

being added to a solution of prussiate of potash, gives the compound of cyanogen and iron, or soluble Prussian blue, which has been just described. The addition of water alters the character of this iodine solution; without water it turns litmus paper green, and with water it has the usual acid reaction, thus apparently confirming Davy's original doubt as to the elementary character of iodine.

2d. I form a neutral *iodide of potassium*, of great purity, and wholly free from alkaline reaction, in manner following:—I take the solution which remained over from the process first described, after the Prussian blue had been precipitated, which solution consisted, as before stated, of a neutral iodide of potassium, with iodide of iron in excess; and I get rid of that excess by the well-known processes of fusion and crystallization. The result is an iodide of potassium, which is as pure as when iodine and potassium are made to act directly on one another, and is perfectly free from the alkaline reaction on turmeric paper, which invariably characterizes the most careful preparations of this salt when carbonate of potassa is employed (as usual) in its manufacture. It is also much less deliquescent than the ordinary iodide of potassium of commerce, and, on account of its great purity, much to be preferred in medicinal preparations.

Blue Printing Ink, No. 1.

3d. I manufacture a blue ink of peculiar intensity, and, therefore, particularly suitable for printing purposes, by using the same materials, and manipulating them in the same way as first described, with the exception that for the iodine, wherever it is used, I substitute bromine, and rub up the precipitate in oil.

4th. I form a *bromide of potassium* of great purity, and wholly free from alkaline reaction, by treating the bromide of potassium, which remains over in a state of solution from the process last before described, in the same way as the

iodide of potassium solution is directed to be used under the second head of this specification.

Black Writing Ink.

5th. I manufacture a very superior black writing ink, by adding to gall ink of a good quality soluble Prussian blue, described under the first head of this specification. The addition of this Prussian blue makes the ink, which was already proof against alkalies, equally proof against acids, and forms a writing fluid which cannot be erased from paper by any common method of fraudulent obliteration, without the destruction of the paper.

Red Writing Ink.

6th. I manufacture, in manner following, a red writing ink, which is greatly superior to the common solutions from peach-wood and Brazil-wood, not only in permanent brilliancy of colour, but also in its freedom from acid, and consequent fitness for use with steel pens. I first boil cochineal repeatedly in successive quantities of pure water, till it ceases, or nearly so, to give out any colouring matter. I then boil it in water containing liquor ammoniæ, which combines after the manner of an alkali with an acid, with the residue of colouring matter, and leaves the insect matter nearly white. The liquid products of these successive boilings are then thrown together into an earthenware vessel, and in order to get rid of a peculiar element or principle still combined with the colouring matter, and which has a great affinity for iron, I precipitate the colouring matter with ammonio-bichloride of tin. The precipitate is afterwards dissolved in ammonia, and protiodide of tin added, till a sufficient degree of brilliancy of colour is obtained, which completes the process, water being added *ad libitum*, according to the degree of body desired to be given to the ink.

Marking Ink, No. 1.

7th. I manufacture, by the improved process following, a marking ink, which may be used with steel pens, and is not only of great intensity of colour, but comes out most readily on the application of heat. I rub together in a mortar nitrate of silver, and the proper equivalent of tartaric acid in a dry state. I then add water, on which crystals of tartrate of silver are formed and the nitric acid set free. I next neutralize this acid by adding liquor ammoniæ, which also dissolves the tartrate of silver. I finally add gum, colouring matter and water, in the usual way, and in quantities which may be varied at pleasure. By this process the nitric acid, which is essential to a good marking ink, is retained, and the tartrate of silver formed is soluble in less than half the quantity of liquor ammoniæ ordinarily required when tartrate of silver is the basis of the ink. The tedious operation of filtering and washing the carbonate of silver, in order to form the tartrate, is also thereby entirely dispensed with.

Marking Ink, No. 2.

8th. I manufacture, in manner following, a marking ink, differing from the preceding, and all other marking inks containing salts of silver only, in this respect, that it cannot be acted on by the common solvents of salts of silver, as cyanide of potassium or chloride of lime, and is so far, therefore, more indelible. I take the ink, as it has been formed by the process last described, and add to it an ammoniacal solution of an oxide, or salt of gold. I have used for this purpose, the purple of Cassius, the hydrosulphite of gold, the ammonio-iodide of gold, and the ammonio-periodide of gold. The two last salts, which I believe to be new salts, I obtain by dissolving iodine in liquor ammoniæ under the application of heat; an operation, however, which requires to be conducted with great caution, in order to prevent the formation of the explosive compound, the teriodide

of nitrogen. This iodine solution is a very speedy solvent of gold. If gold leaf be placed upon it without the addition of water, a black oxide of gold is formed, which immediately dissolves, but if it be diluted with water, the process of oxidation is less rapid, and the gold leaf assumes a fine purple colour (not black) before solution. This salt of gold crystallizes in four-sided prisms, which are soluble in water. A few drops of this solution placed on a slip of glass, generally form microscopic arborescent crystals, from which, under the application of heat, both the iodine and ammonia may be volatilized, and arborescent metallic gold alone remains. If a moderate heat only is employed, one equivalent only of iodine is dispelled, and white crystals of ammonio-iodide of gold remain.

Blue Printing Ink, No. 2.

9th. I manufacture a blue printing ink by taking the soluble precipitate of cyanogen and iron, obtained by the process described under the first head of this specification, and rubbing up the same in oil, after the manner ordinarily followed in the manufacture of printing inks; or by boiling down the blue writing ink produced by the said process, to a sufficient consistence, and then rubbing up the same in oil.

Black Printing Ink, No. 1.

10th. I manufacture a black printing ink by boiling down the black writing ink produced from the materials, and by the process described under the fifth head of this specification, and rubbing it up in oil as aforesaid.

Red Printing Ink.

11th. I manufacture a red printing ink by taking the ammoniacal solution of cochineal, obtained by the process described under the sixth head of this specification, and rubbing it up in oil, adding protiodide of tin according to the degree of lustre required; or by boiling down the red

writing ink, produced by the said process, to a sufficient consistence, and then rubbing up the same in oil as aforesaid.

Black Printing Ink, No. 2.

And, 12th, I manufacture a black printing ink by boiling chips of logwood (for which an extract of logwood may be substituted,) or other dye woods containing colouring matter and tannin, along with as much of a protosalt or persalt of iron, or copper, or other precipitate of tannin, as will be equal to about twice the weight of the tannin contained in the wood or extract employed; whereby I obtain a black or blueish black precipitate, the blueness of which I diminish, as may be required, by the addition of bichromate of potash, more or less. I finally rub up the whole in oil as aforesaid, adding a small quantity of the lamp-black or other black colouring matter, ordinarily employed in the manufacture of black printing inks.—*Pharm. Journ. from Mechanics' Magazine.*

ART. XIX.—ON A NEW AND ECONOMICAL PROCESS FOR MANUFACTURING THE BICHROMATE OF POTASH, CHROMATES OF LEAD AND BICHROMATE OF LIME.

By V. A. Jacquelain.

1. Chalk and chrome ore, previously reduced to a very fine state of division, are intimately mixed in barrels revolving upon their large axis. It is especially requisite that the ore should be finely pulverized and passed through a very fine sieve.

2. The mixture is now calcined for nine or ten hours at a bright red heat upon the sole of a reverberatory furnace, taking care to spread it equally in a layer from 5 to 6 centim. in thickness, and to renew the surface ten or twelve times with the rake. At the end of this time, if the flame was sufficiently oxidizing, the conversion of the oxide of chromium into chromate of lime is effected. This is easily ascertained; in the first place from the appearance of the substance, which exhibits a yellowish-green colour,* and then because it has the property of dissolving entirely in hydrochloric acid with the exception of particles of sand.

3. The very friable and porous mass is now crushed under a mill, mixed with hot water, and the liquid mass constantly kept in agitation, and sulphuric acid added until the liquid slightly reddens blue litmus-paper. This character indicates the complete change of the chromate of lime into bichromate, and the formation of a little sesquisulphate of iron.

4. Some triturated chalk is now gradually added to the liquor until the whole of the peroxide of iron is removed. The bichromate of lime does not by this treatment experience any change as regards its state of saturation.

5. After being allowed to stand quiet for a short time, the clear supernatant liquid, which contains only bichromate of lime and a little sulphate, is drawn off; it may now be used immediately to prepare the bichromate of potash, the neutral and basic chromates of lead, and even the chromates of zinc, which will probably ere long be consumed to a great extent in the arts, since the oxide of zinc has already taken the place of carbonate of lead in white paint with drying oil.

*This singular peculiarity of the chromate of lime with an excess of base, of retaining the green tint of the oxide of chromium, must have led to the belief that no chromate of lime was produced, especially as the latter is scarcely soluble in water.

From the above it is seen that it is useless to prepare the bichromate of potash in order to obtain the insoluble chromates of lead, zinc, baryta, &c., which must render the preparation of these products considerably less expensive; they may readily be obtained by decomposing the bichromate of lime by the acetate or subacetate of lead, chloride of zinc, &c. With respect to the bichromate of potash, it may be as readily obtained, and in a perfectly pure state, by decomposing the bichromate of lime with a solution of carbonate of potash, which will give rise to insoluble carbonate of lime, which is easily washed, and a solution of bichromate of potash, which is concentrated and set aside to crystallize.—*Chem. Gaz. from Comptes Rendus.*

MISCELLANY.

The Tallow Tree.—The tallow tree (*Stillingia sebifera*) is abundant in the valleys of Chusan, and large quantities of tallow and oil are yearly extracted from its seeds: tallow mills are erected in several parts of the island for this purpose.

For the following account of the Chinese method of extracting the tallow from the seeds of the *Stillingia sebifera*, I am indebted to Dr. Rawes, of the Madras army, who was sometime resident in the island of Chusan:—

Method of obtaining the Tallow.

"The seeds are picked at the commencement of the cold weather, in November and December, when all the leaves have fallen from the trees,—this I saw at Singkong when out shooting in the Sah-hoo valley, close by our quarters, through the village. The seeds are in the first place taken to the building where the process of making the tallow is carried on, and picked and separated from the stalks. They are then put into a wooden cylinder, open at top, but with a perforated bottom. This is placed over an iron vessel (about the same diameter or rather larger than the woo den cylinder, and about six or eight inches deep) containing water, by which means the seeds are well steamed, for the purpose of softening the tallow and causing it more readily to separate. The furnace I saw had four or five iron vessels in a row, was about three feet high, four or five feet broad, and eight or ten feet long. The fire was placed at one end, and fed with the husk of the rice, dry grass, and such like cheap materials which make a great flame, and the flue was of course carried directly under the whole of the iron vessels.

"When the seeds have steamed ten minutes or a quarter of an hour, they are thrown into a large stone mortar, and are gently beaten by two men with stone mallets for the purpose of detaching the tallow from the other parts of the seed. They are then thrown upon a sieve, heated over the fire, and sifted, by which process the tallow is separated, or nearly so, although they generally undergo the process of steaming, &c., a second time, that nothing may be lost. The other part of the seed is ground and pressed for oil.

"The tallow now resembles coarse linseed meal, but with more white spots in it, and derives its brown colour from the thin covering over the seed (between it and the tallow) which is separated by the pounding and sifting. In this state it is put between circles of twisted straw, five or six of which are laid upon each other, and thus forming a hollow cylinder for its reception. When this straw cylinder (we may call it so) has been filled, it is carried away and placed in the press, which is a very rude and simple contrivance, but which, like every thing Chinese, answers the purpose remarkably well. The press consists of longitudinal beams of considerable thickness, placed about a foot and a half, or two feet asunder, with a thick plank at the bottom, forming a kind of a trough, and the whole is bound together with iron. The tallow is pressed out by means of wedges driven in very tightly with stone mallets, and passes through a hole in the bottom of the press into a tub, which is sunk there to receive it. It is now freed from all impurities, and is a semifluid of a beautiful white colour, but soon gets solid, and in cold weather is very brittle. The inside of the tubs which collect the tallow are sprinkled or dusted over, with a fine red earth, well dried, which prevents the tallow from adhering to their sides. It is thus easily removed in a solid state from the tubs, and in this condition the cakes are exposed for sale in the market. As the candles made from this vegetable tallow have a tendency to get soft and to melt in hot weather, they are commonly dipped in wax of various colours, as red, green, and yellow. Those which are intended for religious purposes are generally very large, and finely ornamented with golden characters.

"The cake, or refuse, which remains after the tallow has been pressed out of it, is used for fuel, or to manure the land, and so is the refuse from the other part of the seeds from which oil is extracted."

Pharm. Jour., from Fortune's Wanderings in China.

Opium Smuggling.—The statements which have been frequently made in England, both as regards the smuggling and the smoking of opium, are very much exaggerated. When I first went to China, I expected to find those merchants who were engaged in this trade little else than armed buccaneers, indeed, if I do not mistake, they have been represented as characters of this kind on the English stage. Instead of this, the trade is conducted by men of the highest respectability, possessed of immense capital, and who are known and esteemed as merchants of the first class in every part of the civilized world. The trade in opium, although contraband, is so unlike what is generally called smuggling, that people at a distance are deceived by the term. It may be quite true that its introduction and use are prohibited

by the Chinese government; but that prohibition is merely an empty sound, which, in fact, means nothing. The whole, or at least the greater part of the mandarins use it, and it is not at all unlikely that his Celestial Majesty himself makes one of the number of its devotees. The truth is, the Chinese government, whatever it may say, has no wish to put a stop to its introduction. It is necessary, however, to publish every now and then strong threatening edicts against it, which are only consigned to oblivion in the pages of the Peking Gazette, and have no effect whatever in restraining the Emperor's loyal subjects. It is now the opinion of all intelligent foreigners, and also many of the more enlightened amongst the Chinese themselves, that the importation of opium ought to be legalised, and it should be admitted at a small duty, as, by this means, much of the demoralising effects of smuggling would be got rid of, and a considerable revenue would flow into the coffers of the Chinese treasury.

Many instances of the feeble kind of opposition which the Chinese government employ to stop the opium trade, occurred during my residence in the country. Sometimes an admiral, renowned for his valour, was sent with a number of war-junks to a particular station, where the opium ships were anchored, for the purpose of compelling them to leave the Chinese shores. Gongs were beat, guns were fired, at a respectful distance, however, and the junks came down with all that pomp and parade which the Chinese know so well how to assume, and which seem to form a principal part of their warlike operations. In the mean time the little opium vessels were seen quietly at anchor, apparently paying but slight attention to all these threatening demonstrations. Presently a message was sent from the admiral, ordering them to get up their anchors and stand out to sea, and never more to dare to enter the waters of his Celestial Majesty under the penalty of being completely annihilated.

A summons like this in former days might have had some weight, but now it had none; and the only answer the messenger carried back was, "that the foreign vessels were well armed, and that they would not leave their anchorage." This was quite sufficient to cool the courage of the admiral, who was now in a dilemma; he durst not fight the "barbarians," and if he did not manage to get them out of the way, his character for courage would suffer when the affair was represented at head-quarters. He therefore altered his tone, and *requested* the captains, as a great favour, to leave the anchorage and move outside for a day or two only, after which time they might return to their old quarters. This was agreed to on the part of the captains of the opium vessels, and on the following morning they got under weigh and went out to sea. The Chinese, who were on the look-out at the

time, made a great noise by beating gongs and firing guns, and followed the opium ships until they were fairly outside. The admiral now, sent up a report to his government to the effect that he had fought a great battle with the "barbarians," and had driven them away from the shores; or very probable he said that he had blown some of their vessels to pieces, and sunk the rest in the depths of the sea. In the mean time, even before the report was half-way to Peking, the opium vessels had quietly taken up their old anchorage, and things were going on in the usual way! Such is a specimen of the way in which affairs are managed in China.—*Ibid.*

Opium used in China.—The opium from Bengal, which consists of two kinds—namely, *Patna* and *Benares*—is always of a good quality and pure; but the Bombay *Malwa* is now so much mixed up with other ingredients, that the Chinese smuggler will not buy it until he has had an opportunity of testing its quality. This is done in the following manner:—having selected the chest or number of chests which he wishes to purchase, they are opened, and he takes out three or four of the worst looking cakes, cuts a small piece from each, and dissolves them in a copper ladle over a charcoal fire. When the opium is melted, it is poured out into a coarse paper filter. If it is not of the worst description it readily passes through the paper into a small basin which is placed under it. When it will not pass through the filter, the Chinese call it *Man-ling;* by which name they designate opium which is so bad, or so mixed with extraneous ingredients, that it will not dissolve in water or pass throngh the paper filter. This description of the drug, is of course, only bought at a very reduced price.

When the mixture passes through the filter, the paper is carefully examined, and if any sediment remains, such as sand or rubbish, with which the opium is frequently adulterated, it detracts considerably from its value. The filtered mixture is now put again into a clear copper pan, and boiled slowly over the charcoal fire, until the whole of the water is evaporated, and nothing remains but pure opium. The drug is then poured out into a small porcelain cup, and stirred round and examined with great care. At this stage of the process, colour forms the principal test of its quality, and as the smuggler stirs it round, and holds it up to the light, he pronounces it to be "*tung-kow,*" if it is thick like jelly; "*pak-chat,*" if it has a whitish colour; "*hong-chat,*" if it is red; and "*hong-see-pak,*" if it is opium of the first quality, or like that sent round by the East India Company.—*Ibid.*

Opium Smoking.—Opium is prepared for smoking much in the same manner as I have described, and is kept in small cups, which are

made for the purpose. The smoker lays his head on a pillow, has a lamp by his side, and with a kind of needle he lifts a small portion of the opium to the candle, and having ignited it, he puts it into the small aperture of the bowl of the pipe. The candle is applied to the bowl during the process of inhaling; and the smoke is drawn into the lungs in the same manner as an Indian or Chinese swallows tobacco. A whiff or two is all that can be drawn from a single pipe, and, therefore, those who are accustomed to the use of the drug have frequently to renew the dose.

No one who has seen any thing of the habits of the Chinese will deny that the use of opium, particularly when taken to excess, has a most pernicious effect both upon the constitution and morals of its victims. From my own experience, however, I have no hesitation in saying that the number of persons who use it to excess has been very much exaggerated; it is quite true that a very large quantity of the drug is yearly imported from India, but then we must take into consideration the vast extent of the Chinese empire, and its population of 300,000,000 of people.* I have often been in company with opium-smokers when travelling in different parts of the country, and am consequently able to speak with some confidence with regard to their habits. I well remember the impressions I had on this subject before I left England, and my surprise when I was first in the company of an opium-smoker who was enjoying his favourite stimulant. When the man lay down upon the couch, and began to inhale the fumes of the opium, I observed him attentively, expecting in a minute or two to see him in his "third heaven of bliss;" but no: after he had taken a few whiffs he quietly resigned the pipe to one of his friends, and walked away to his business. Several others of the party did exactly the same. Since then I have often seen the drug used, and I can assert, that in the great majority of cases it was not immoderately indulged in. At the same time I am well aware that, like the use of ardent spirits in our own country, it is frequently carried to a most lamentable excess. Lord Jocelyn, in his "Campaign in China," gives the following account of its effects, which he witnessed upon the Chinese at Singapore: "A few days of this fearful luxury, when taken to excess, will give a pallid and haggard look to the face, and a few months, or even weeks, will change the strong and healthy man into little better than an idiot or skeleton. The pain they suffer when deprived of the drug after long habit, no language can explain: and it is only when to a certain degree under its influence that their faculties are alive. In the houses devoted to their ruin, these infatuated people may be seen at

*The population of China has been estimated lately at 367,000,000.

nine o'clock in the evening in all the different stages; some entering half distracted to feed the craving appetite they had been obliged to subdue during the day: others laughing and talking wildly under the effects of a first pipe; whilst the couches around are filled with their different occupants, who lie languid with an idiot smile upon their countenance, too much under the influence of the drug to care for passing events, and fast merging to the wished-for consummation. The last scene in this tragic play is generally a room in the rear of the building, a species of dead-house, where lie stretched those who have passed into the state of bliss the opium-smoker madly seeks—an emblem of the long sleep to which he is blindly hurrying."—*Ibid.*

Action of Hydracids upon Oxyacids. By C. Lecomte.—The action of hydracids upon the oxyacids has not hitherto been investigated in a general manner. We possess, in fact, but a memoir by M. Baudrimont upon the formation of nitromuriatic acid, by the reciprocal action of hydrochloric and nitric acids dissolved in water; and a notice by M. Millon, who observed that sulphuretted hydrogen was without action upon nitric acid previously deprived of hyponitric acid by means of nitrate of urea and diluted with twice its volume of water. I trust therefore that the following researches will prove interesting to chemists.

The apparatus which I have employed to study the action of hydrosulphuric acid upon nitric acid is very simple. It is composed of a balloon communicating with a washing-flask, and this with a second flask surmounted by a tube for collecting the gases; when all is thus arranged, some fragments of the sulphuret of antimony and hydrochloric acid are conveyed into the balloon and some milk of lime into the washing-flask. The balloon is placed over a charcoal furnace. When all the air of the apparatus had been expelled, 85 grms. of nitric acid of 1.33 spec. grav., freed from hyponitric acid by means of nitrate of urea, were poured into the second flask kept in water, which was carefully maintained at a temperature of 64°–68° F.

On the appearance of the first bubbles of sulphuretted hydrogen in the nitric acid, a considerable number of minute bubbles were observed to be disengaged from different points of the liquid; at the same time sulphur separated and remained in suspension; the atmosphere of the flask became of an orange colour, and the nitric acid so intensely green as to prevent the passage of light; gradually this colour diminished, and the sulphur aggregated into a mass at the surface of the liquid. The action was continued until the sulphuretted hydrogen passed through the nitric acid without experiencing any change.

The sulphur obtained in this manner formed an opake spongy mass of a pure yellow colour. After freeing it by washing from the acid liquid it contained, although obtained in the cold, it exhibited all the elastic properties presented by soft sulphur obtained with the assistance of heat and immersion in cold water. Nevertheless, in the circumstances under which the experiments were made, the temperature never rose above 68°–77°; the chemical reaction sufficed therefore to produce a phenomenon which under ordinary circumstances requires an elevation of temperature of about 482°. This sulphur was kept for eight days in water; it was still somewhat elastic, and its colour had but slightly decreased.

The gases which are disengaged in the preceding operation vary according to the period when they are collected. At the commencement, and for about three hours, they consist of a mixture of deutoxide of nitrogen and of hyponitric acid; the latter gradually disappears, and is replaced by sulphuretted hydrogen. It will presently be seen that the presence of one of these two gases in a mixture indicates the absence of the other; in a word, these two gases are incompatible.

The mixture of deutoxide of nitrogen and of sulphuretted hydrogen which is disengaged during the remainder of the operation, exhibits a very remarkable phenomenon; it is partly decomposed in passing through water, which is rendered milky by the eliminated sulphur; but the bubbles which burst at the surface form, when the air is undisturbed, very regular rings, analogous to those presented by phosphuretted hydrogen when it ignites spontaneously on its issue from water. This phenomenon is readily explained by the action of hyponitric acid upon sulphuretted hydrogen; these two gases being incompatible, and each bubble being a mixture of sulphuretted hydrogen and deutoxide of nitrogen, the air acting upon the latter by its oxygen converts it into hyponitric acid, which in its turn decomposes the sulphuretted hydrogen; and as this action is only exerted upon the central and peripheral parts which are in contact with the air, the rings above mentioned are formed.

The following experiments prove decidedly that hyponitric and hyposulphuric acids are not compatible. If a bell-glass containing a mixture of deutoxide of nitrogen and sulphuretted hydrogen is observed, the gases are not decomposed immediately; but on introducing merely a few bubbles of oxygen, the gases are coloured, sulphur is deposited upon the sides of the vessel, and the colour disappears; a further addition of oxygen reproduces the same phenomena, which can be repeated until the sulphuretted hydrogen has entirely disappeared. This curious reaction of the deutoxide of nitrogen promises

to be of considerable importance in the industrial arts. Sulphur does not occur in France, but considerable quantities of sulphate of lime; this decomposed with coal, and the moist sulphuret obtained decomposed in its turn by the carbonic acid derived from any furnace, would yield sulphuretted hydrogen. This gas, conveyed into a chamber containing air and deutoxide of nitrogen, would furnish water and sulphur; so that a small quantity of deutoxide of nitrogen would suffice in this case, as in the preparation of sulphuric acid, for the transformation of a large quantity of the reacting bodies.

In Berzelius's "Manual of Chemistry," it is stated that the deutoxide of nitrogen and sulphuretted hydrogen are mutually decomposed; that sulphuret of ammonium or the hydrosulphate of ammonia and the protoxide of nitrogen are formed. This reaction is true when the gases are moist, but when dry they do not react upon each other.

The liquid derived from the action of the sulphuretted hydrogen upon the nitric acid was separated from sulphur and again mixed with the wash-waters of this latter body; the whole was saturated hot with carbonate of baryta until the appearance of a slight ammoniacal odour; a few drops of sulphuric acid were added to neutralize the liquid; it was then thrown upon a filter, the precipitate of sulphate of baryta well washed, and all the liquids united and evaporated until there remained but 100 grms.; the crystalline residue kept for several hours at a temperature of 113°, weighed 3.80 grms. Analysis has proved that this salt is formed almost entirely of sulphate of ammonia, containing so minute a quantity of the nitrate that the protosulphate of iron is scarcely coloured by it in the presence of sulphuric acid.

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